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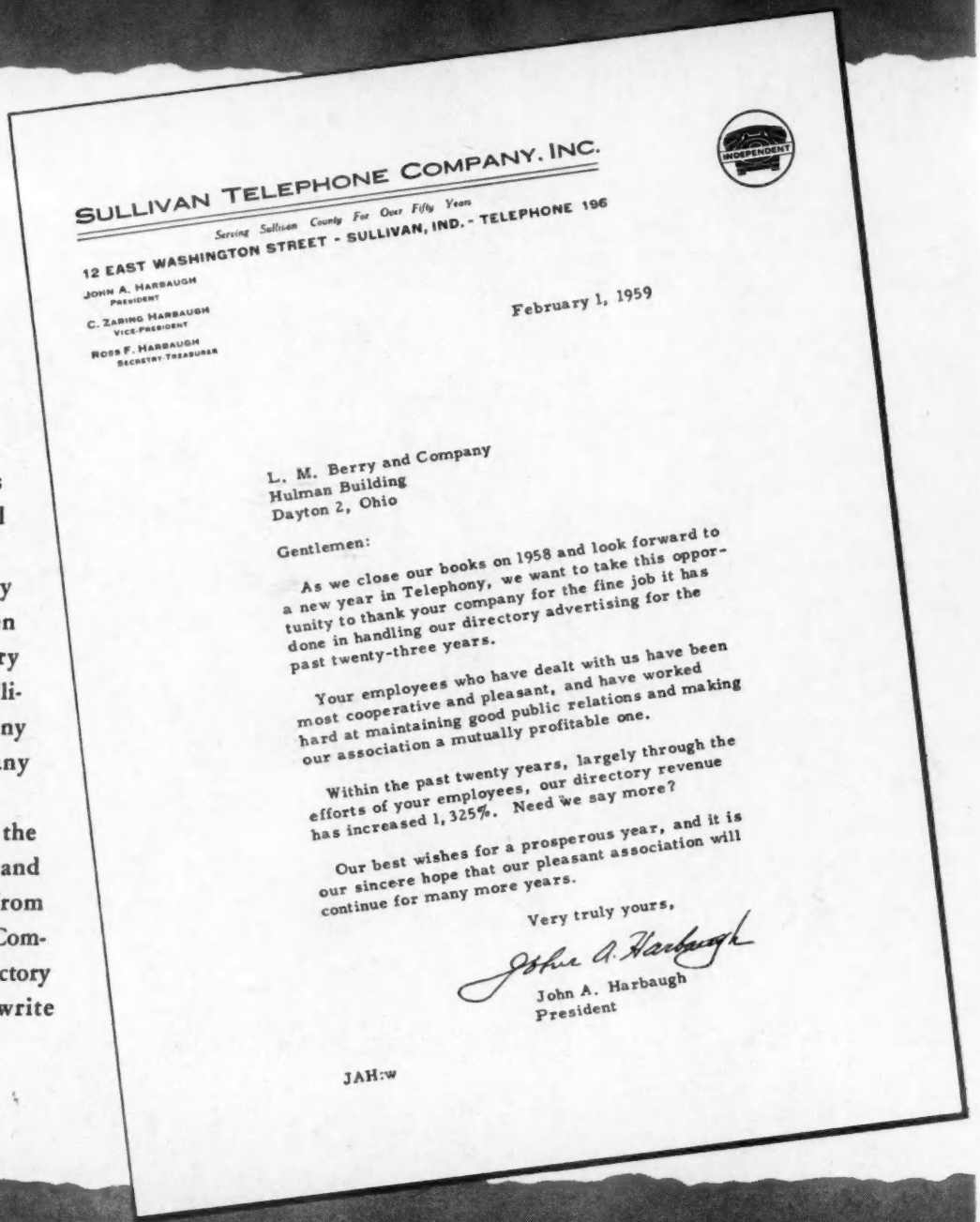

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February 1, 1959

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Your employees who have dealt with us have been most cooperative and pleasant, and have worked hard at maintaining good public relations and making our association a mutually profitable one.

Within the past twenty years, largely through the efforts of your employees, our directory revenue has increased 1,325%. Need we say more?

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Very truly yours,

John A. Harbaugh

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why HEINS TELEPHONE CO. ...along with thousands of Independents all over America... uses SHERRON STEEL BOOTHS

Halfway measures won't do when it comes to providing satisfactory outdoor phone booth facilities. Never was this more true than it is today when better than half of all outdoor phone calls are made on the spur of the moment.

Nobody knows this better than Joe Lawrence, of the Heins Telephone Company, Sanford, North Carolina.

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Obviously, Sherron steel booths add up to a bigger pay-off in outdoor paystations. (The Sherron steel booth shown here is Model 17S-Type 2 in Flame Red). REA and UL approved.

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By using astute merchandising methods, you can make this unit one of your top revenue producers. Each instrument can answer any line . . . provide high-gain, high-efficiency transmission. Handsomely modern, too—perfect for home as well as for commercial use. *Available immediately* in black, white and decorator colors.

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NOW IN COLOR

Extra long receiver KOILED KORDS in color enable you to offer another service to those subscribers who want to move more than four and a half feet from their instruments.

New, long KOILED KORDS retractile cords in color — and in black — are offered in two standard lengths, 18 inches retracted that extend to approximately 9 feet and 30 inches retracted that extend to 15 feet. Extra long receiver KOILED KORDS are available in colors to match all telephones. See your telephone supply house for full information.

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TELEPHONE ENGINEER & MANAGEMENT

the telephone industry magazine

VOL. 63, NO. 10 CONTENTS MAY 15, 1959

FEATURES

The TE&M Editorial — "Prepare For Tomorrow's Challenge" 35
The Anatomy of Attrition ..... P. M. Schuchart 39
Broader Service Horizons ..... V. N. Vaughan 41
A Wide-Band Audio Voltmeter ..... C. D. Ehinger 45
The "Factograph" Camera ..... John P. Thompson 72

DEPARTMENTS

Coming Conventions 12
Washington Observations ..... Roland Davies & Fred Henck 22
Commercial Department Notes ..... Allan R. Stacey 49
Accounting Notes ..... Dr. G. M. Jones 51
TE&M's "Electronics Notebook" ..... Leo G. Sands 52, 54, 56
Plant Notes On New Developments ..... John S. Reed 57
TE&M's "Plant Man's 'Spec' Book" 61, 65, 75
Courts & Commissions 91
Industry News Briefs 93
The Back of The Book ..... John G. Reynolds 114

PRODUCTS & SERVICES

New Products' Showcase ..... Dick Reynolds 76
Professional Services 100-101
Classified Advertising 102-103
Advertisers' Index 113

FRONT COVER

One of Iowa's top telephone families — the McFarlins of Montezuma — was honored recently when Mrs. Clyde McFarlin was named Iowa's "Mother of The Year." The TE&M front cover photo shows Mrs. McFarlin at the recent convention of the Iowa Independent Telephone Association at Des Moines with (left to right, beginning at top row): JOHN J. McINTOSH, Cedar Rapids; USITA President HUGH A. BARNHART, Rochester, Ind.; BILL MILLER, secretary of the Iowa association; HAROLD R. BOLLINGER, Waconia, Minn.; and C. C. PEARCE, Riceville, Ia.; (second row) Mrs. McFarlin's son NORMAN, deputy administrator, REA Telephone Staff, Washington, D. C., Mrs. McFarlin, and her husband CLYDE, president of the Montezuma (Ia.) Telephone Co.

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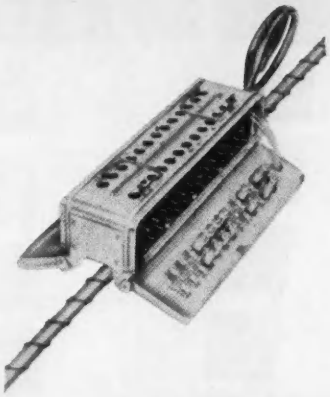
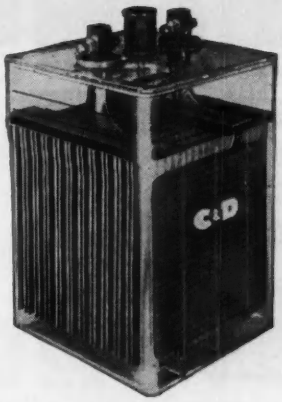


The 26 Pair Cook Stranterm is available with plastic or lead cable stubs. Only strand mounted Cable Terminal designed for a flexible system of selective discharger protection. Can be supplied with either Minigap or Mytigap arresters. COOK ELECTRIC COMPANY.



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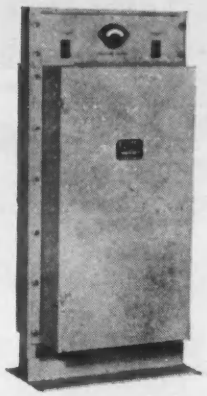
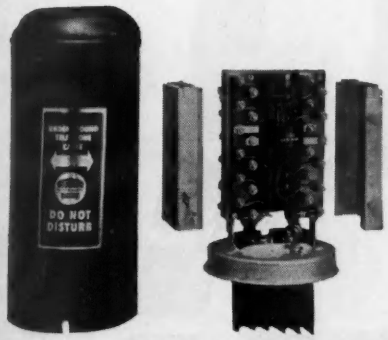
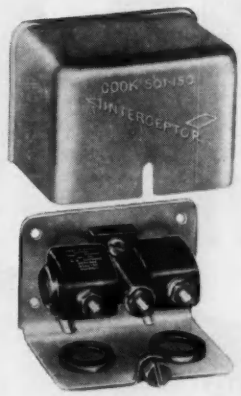


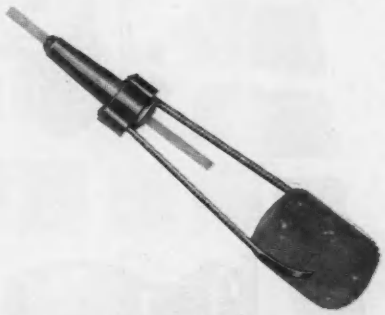
Automatic Constant Voltage Charger—operates without moving parts. Compensates for changes in input voltage load. Single-Phase Flotrol in the 24 and 48 volt types are available in range of sizes from 1 to 24 amperes. LORAIN PRODUCTS CORPORATION.



CEECO LUG-12 Pedestal Parkway Terminal—for direct buried wire or plastic cable. Two-piece pedestals, 6′ long; brackets available for pole mounting. Accessible for testing, splicing, cross connecting, buried wire distribution. All-steel construction. Side plates give nominal air gap protection at stud ends. Type C637 Loading Coils used on CEECO Type 177 R.D.W. Terminals are interchangeable in both terminals. COMMUNICATION EQUIPMENT AND ENGINEERING COMPANY.



The Cook Interceptor is a fuseless, carbon-to-carbon arrester which grounds power cross surges and lightning. Minigap or Mytigap arresters are mounted in a moisture-resistant and dirtproof receptacle. A product of COOK ELECTRIC COMPANY.



Stronger Than Steel Strand Reliable STRANDLINK® is an automatic type tension splice that requires no special tools. Only a few seconds are needed to engage strand in each end of a STRANDLINK. Grip on the strand is so distributed that the splice is stronger than the strand itself. STRANDVISE® is an automatic type dead-end using same safe-grip principle as STRANDLINK. Both are available in 3/16" through 7/16" strand sizes; STRANDLINK also in 5/16" to 1/4", 3/8" to 5/16" and 7/16" to 3/8" reducer sizes.
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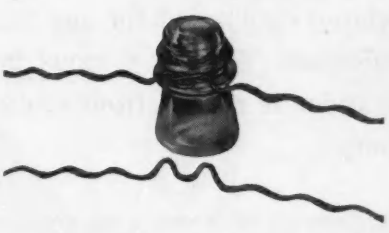
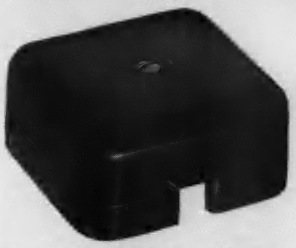


Crapo Pretied Splints can be attached to insulator on the ground. Easy to install. Save time and labor. Permit resagging line wire without removing tie wire. Produced for galvanized steel and copper/steel telephone line wire. INDIANA STEEL & WIRE COMPANY, INC.

Copperweld Lashing Wire—.091 or .080 special soft copperweld lashing wire is recommended for areas subject to corrosive fumes or atmosphere; should be used with copper or copperweld strand. Coiled by CABLE SPINNING EQUIPMENT COMPANY.

Terminals, protectors and associated equipment for any telephone operation are provided for you at our warehouses. You get famous brands like Reliable and Cook. In most cases, your order is picked from stock and shipped the same day it arrives in our warehouse.

Your supply business is important to us. We want to receive orders from you today...and for many years ahead. And, the best way we can do this is to give you *prompt delivery* from a *large stock* of *famous brands*. Next time you need terminals and protectors, give us a call. We'll stay up nights to prove—at AE, you get all 3.



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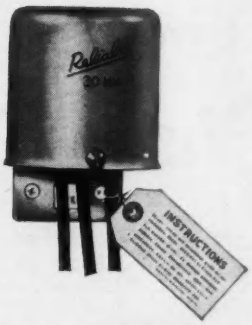

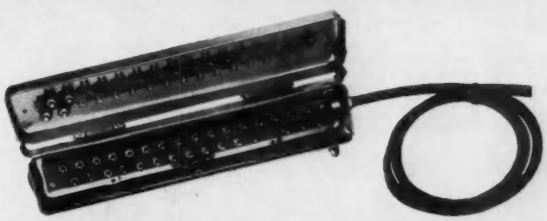

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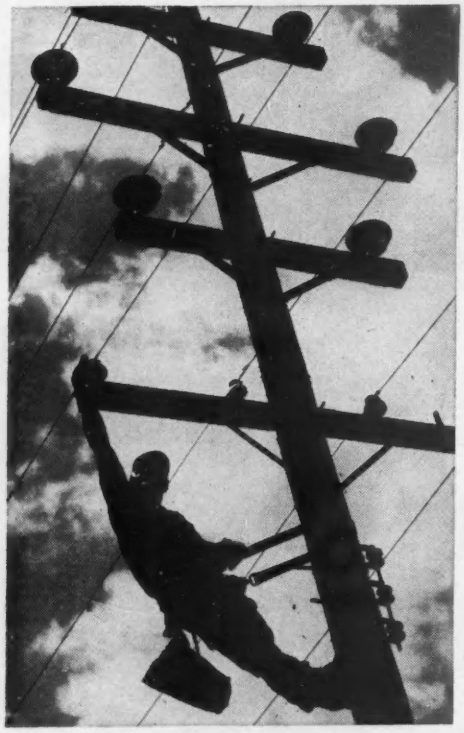

String your lines with

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When you use Amertel 195 to string your rural telephone lines, you get a real bonus. Much longer spans are possible—up to 700 feet. Fewer poles are needed; reducing the time and expense of pole maintenance per mile of line.

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- Longer spans, fewer poles, means lower installation costs.
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basic electricity

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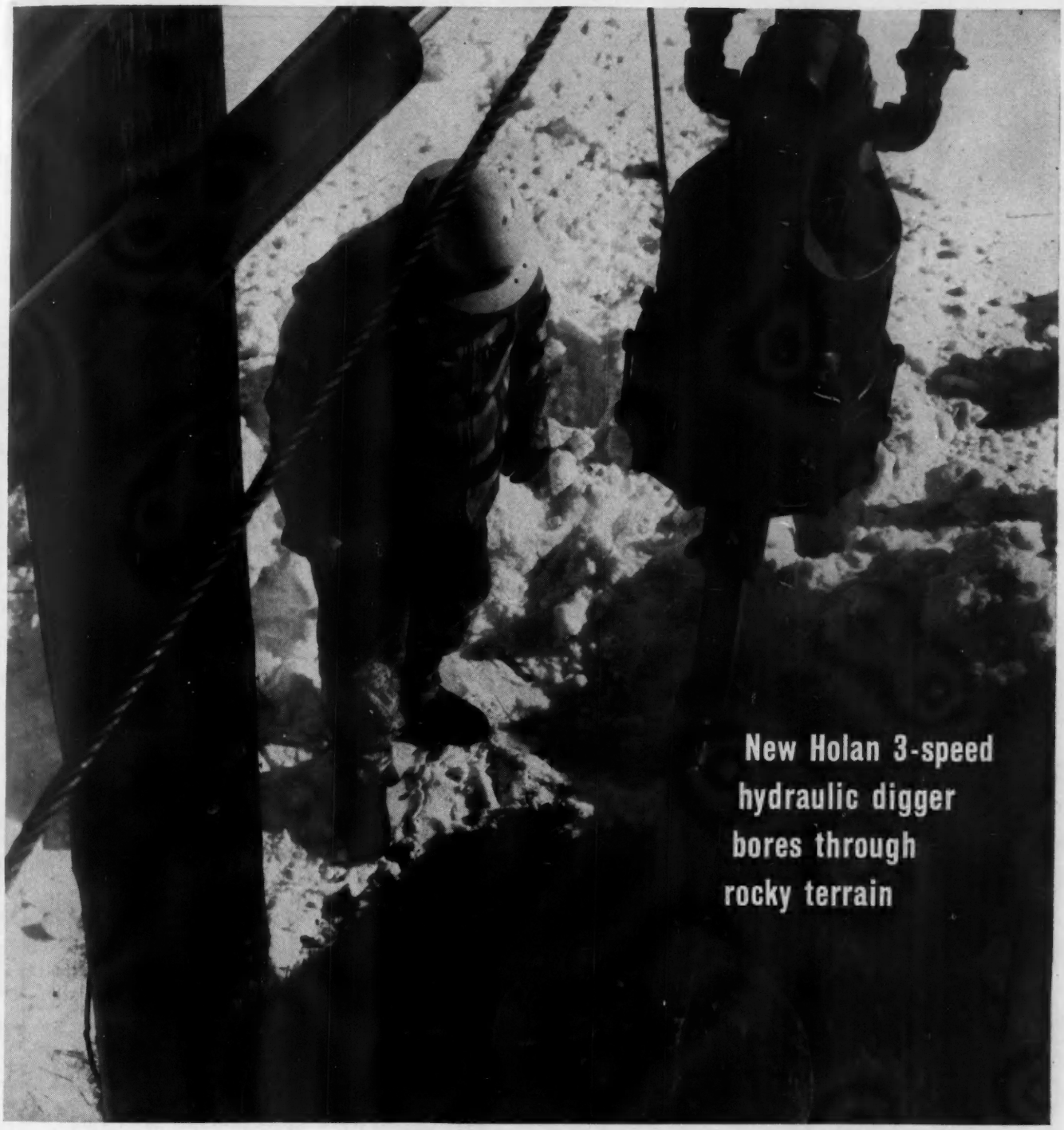

Torque: 8,400 ft.-lbs.

There's a new kind of hydraulic digger in the field—a digger with greater auger torque than any other derrick-suspended borer in use today.

The Holan 3-speed Series 5400 Digger handles augers up to 30 inches in diameter, and provides 8,400 ft.-lbs. torque. In addition to the high torque speed for big augers and tough digging, there's a faster speed for normal digging and augers 16 inches or less. A third speed is for spinning dirt and mud off the auger blades.

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coming

CONVENTIONS

KANSAS - MISSOURI Telephone Associations, Continental Hotel, Kansas City, Mo., May 25-26, 1959.

PENNSYLVANIA Telephone Association, Buck Hill Falls Inn, Buck Hill Falls, June 1-3, 1959.

CALIFORNIA Telephone Association, Ambassador Hotel, Los Angeles, June 3-5.

WASHINGTON-OREGON Telephone Associations, Olympic Hotel, Seattle, Washington, June 11-12-13.

NEW YORK Telephone Association, Scaroon Manor, Schroon Lake, June 15-17.

TENNESSEE Telephone Association, Hermitage Hotel, Nashville, Tennessee, Sept. 9-10, 1959.

ARKANSAS Telephone Association, Arlington Hotel, Hot Springs, Ark., Sept. 14-15, 1959.

MICHIGAN Telephone Association, Pantlind Hotel, Grand Rapids, Mich., September 15, 16, 17, 1959.

ROCKY MOUNTAIN Tel. Association, Utah Hotel, Salt Lake City, Utah, September 16, 17, 18, 1959.

WEST VIRGINIA Tel. Association, Blackwater Falls Lodge, Davis, W. Va., Sept. 23, 24.

NORTH CAROLINA Tel. Association, Carolina Hotel, Pinehurst, N. C., Oct. 5-6.

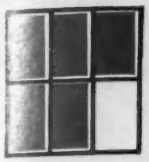
NATIONAL CONVENTION, Conrad Hilton Hotel, Chicago, Ill., Oct. 11-14.

VIRGINIA Tel. Association, Roanoke Hotel, Roanoke, Va., Oct. 29-30.

ALABAMA Tel. Association, Thomas Jefferson Hotel, Birmingham, Ala., Nov. 9-10.

OKLAHOMA Tel. Association, Skirvin Hotel, Oklahoma City, Nov. 18-19.

FLORIDA Tel. Association, Robert Meyer Hotel, Jacksonville, Fla., Nov. 30, Dec. 1.



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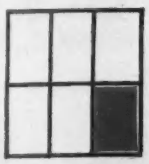
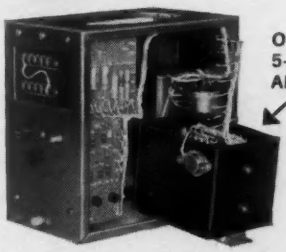
Transistor circuits for long trouble-free life. No moving parts. No routine maintenance. Operates from 50-volt battery at extremely low drain.



COMMON EQUIPMENT UNIT



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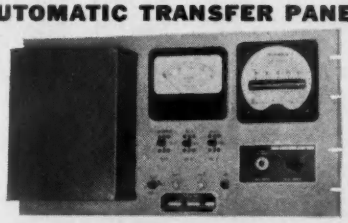

Connects two ringing machines together with either as the main machine, the other as standby. Load is automatically transferred to the standby and alarm is operated on partial or complete failure of the main. Manual transfer possible to check the standby. Either machine supplies load while other is metered for adjustment or tested with simulated ringing failure. Other panels available: portable, manual transfer and supervisory.

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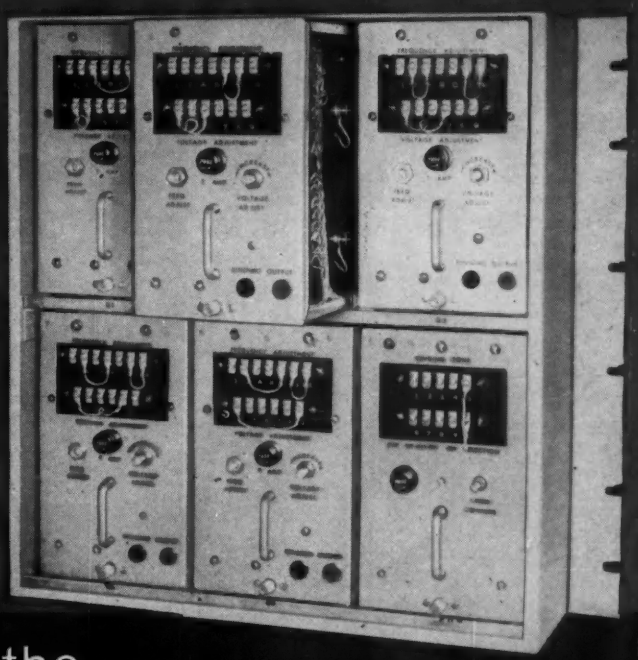

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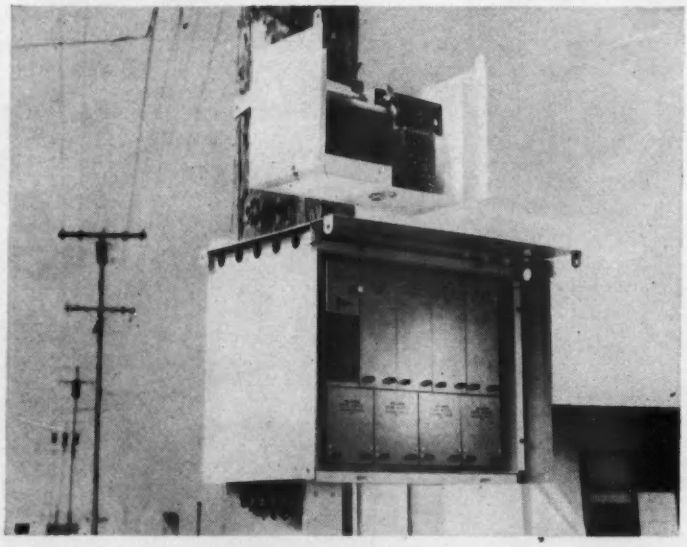

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Only Kellogg's K-31 makes rural subscriber carrier so economical and practical for independents. With Kellogg's exclusive repeaters you substantially increase the length of line over which the K-31 System operates—and at amazingly low cost. Actually, you can *double* K-31 carrier system mileage with one low-cost Kellogg repeater, *triple* mileage with two repeaters!

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Built-in Compandors! Reduce line noise and crosstalk on open wire line so that marginal circuits meet transmission standards.

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Completely transistorized! Another Kellogg exclusive! Guarantees toll quality performance.

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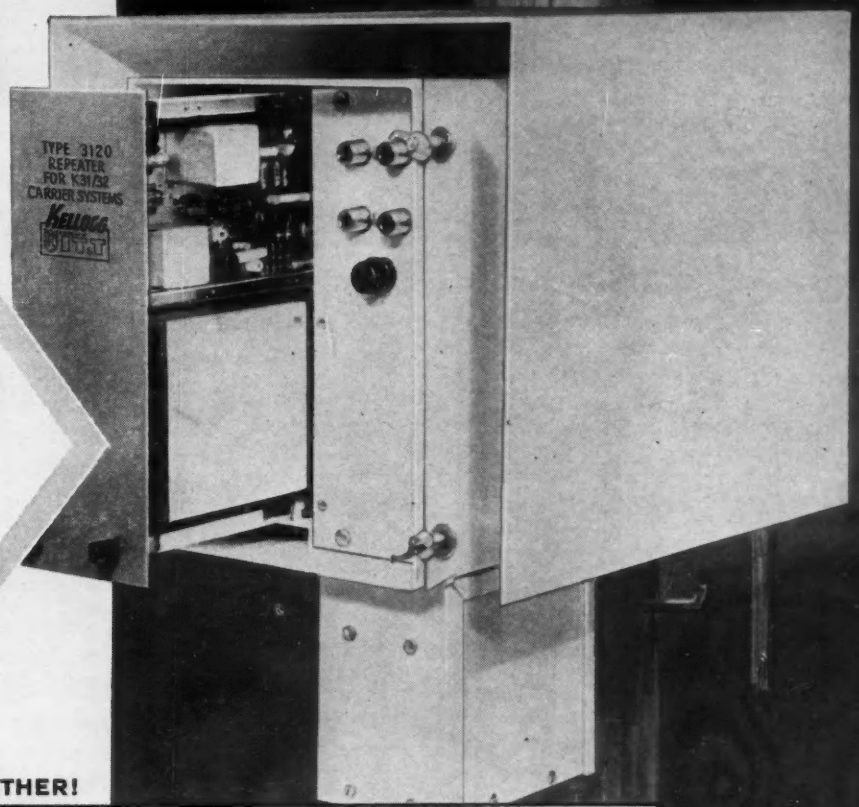

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√	Repeaters	yes	no	no	no	no
√	Built-in compandors	yes	no	opt.	no	no
√	Automatic regulation device	yes	yes	yes	no	no
√	Standard emergency power	yes	no	no	no	no
√	Plug-in components	yes	no	yes	no	yes
√	Power consumption (watts)	2.5	30	14	25	35
√	Transistorized printed circuits	yes	no	yes	no	no
√	Transistorized power supply sub. term.	yes	no	no	no	no

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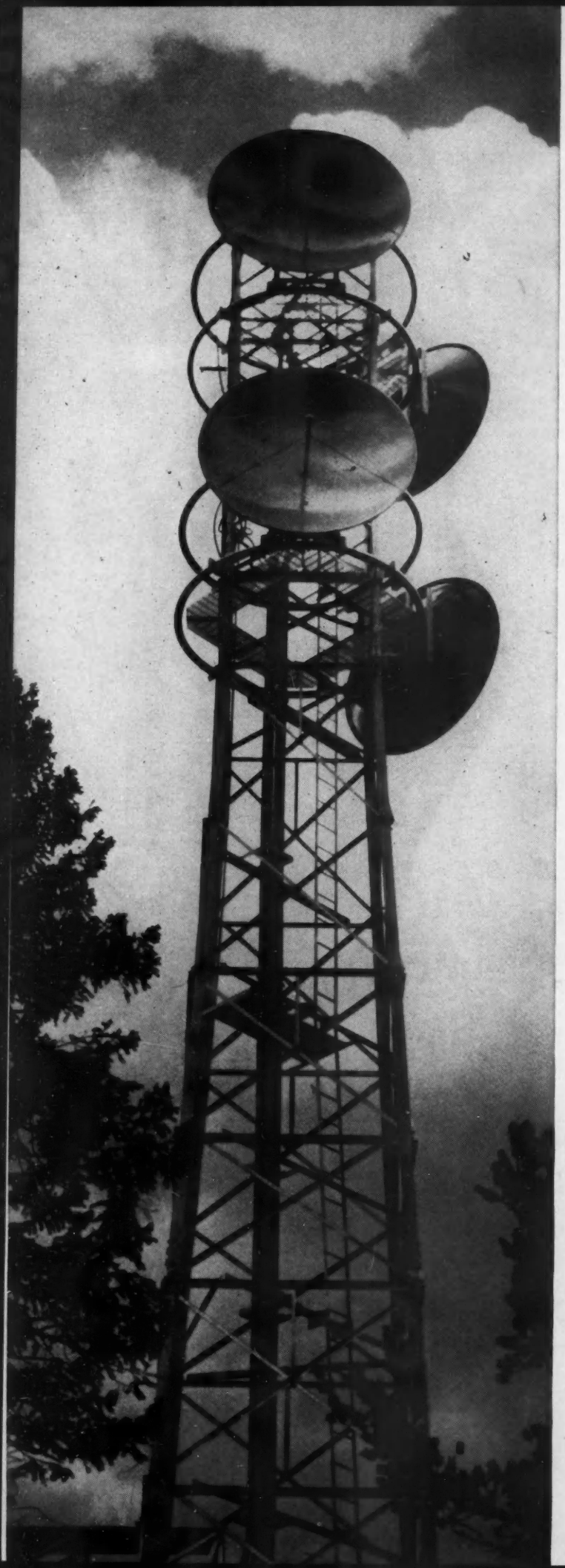

Mountain States Telephone and Telegraph chooses Blaw-Knox Towers for Microwave Expansion

In an area of rugged terrain, where 100 mile-per-hour wind velocities are common, Microwave proved the economical way to add long distance facilities for Mountain States Telephone and Telegraph Company, Denver, Colorado.

Designed to supplement existing long distance circuits, the 235-mile system uses 9 self-supporting Blaw-Knox Microwave Towers. These dependable structures, ranging in height from 44½ to 200 feet, are spaced from 18 to 54 miles apart, and are equipped with 8- and 10-foot diameter, parabolic antennas. Special anchoring methods were used to withstand the unusually strong winds in the area.

Like many other Telephone Companies, Mountain States chose Microwave as the most economical way to improve service. And they rely on Blaw-Knox Towers to provide trouble-free service with built-in provision for future expansion.

If you are considering system expansion or conversion using Microwave, you should have the full story of Blaw-Knox Tower engineering, fabrication, and erection services. Contact the Tower and Antenna group with your specific requirements.

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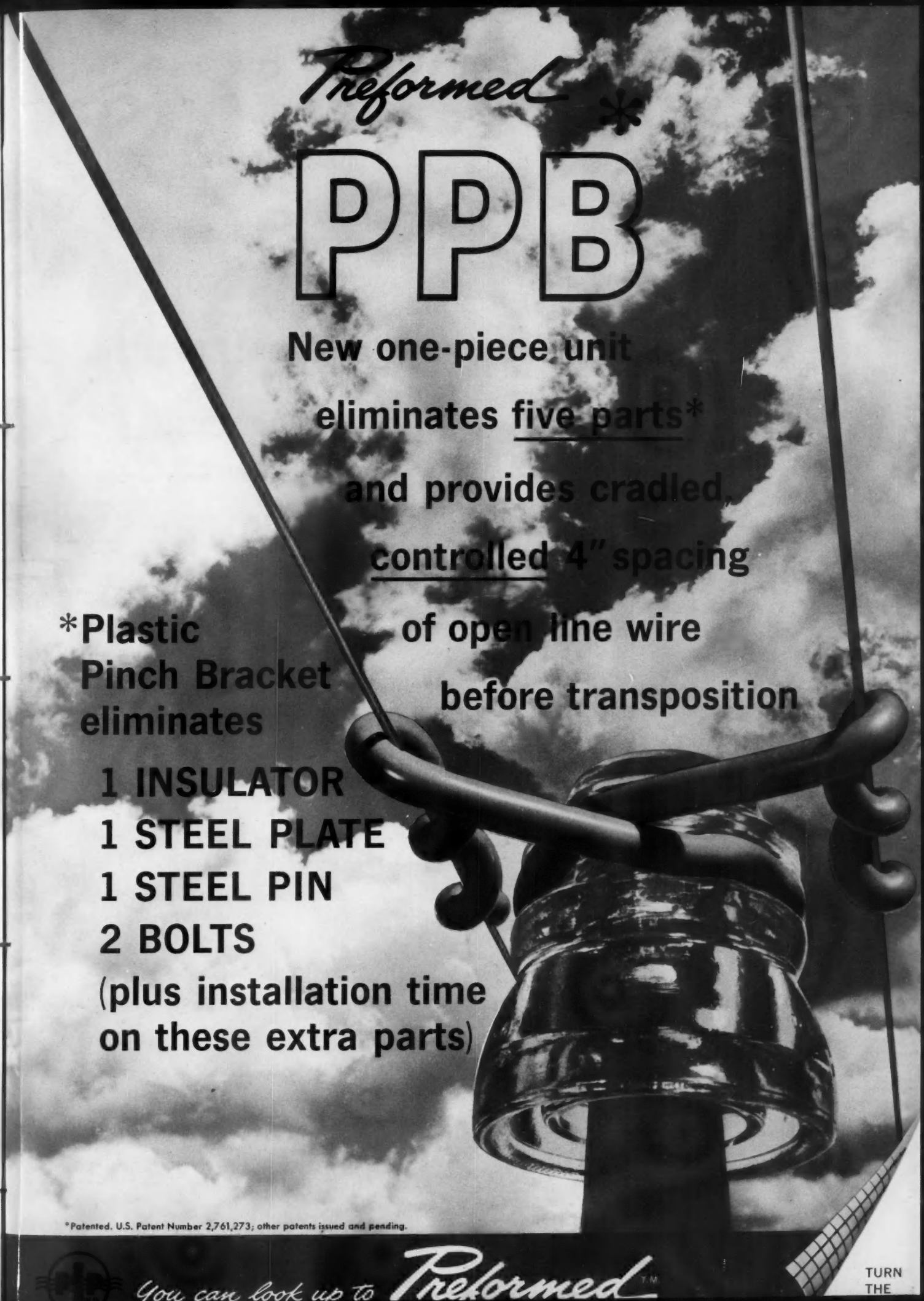
This Blaw-Knox Microwave Tower, located at Badger Mountain, in central Colorado, is one of nine in the system. Five repeaters are used in the 180-mile, Denver-Montrose link, and two are used in the 55 miles between Montrose and the terminal in Grand Junction. Transmitting equipment operates on 4,000 megacycles.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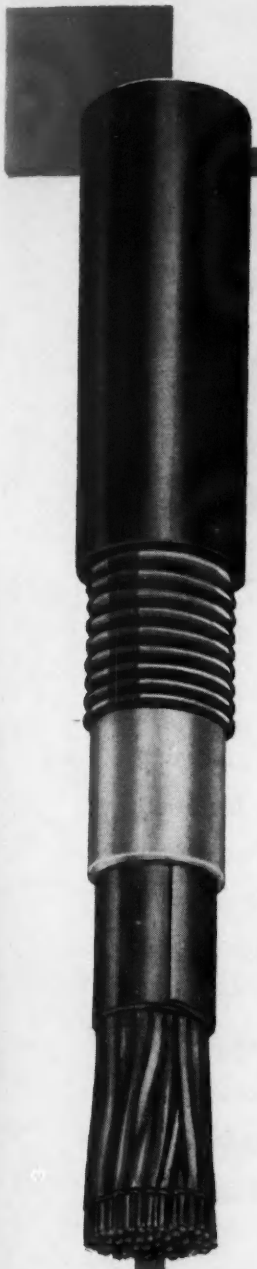

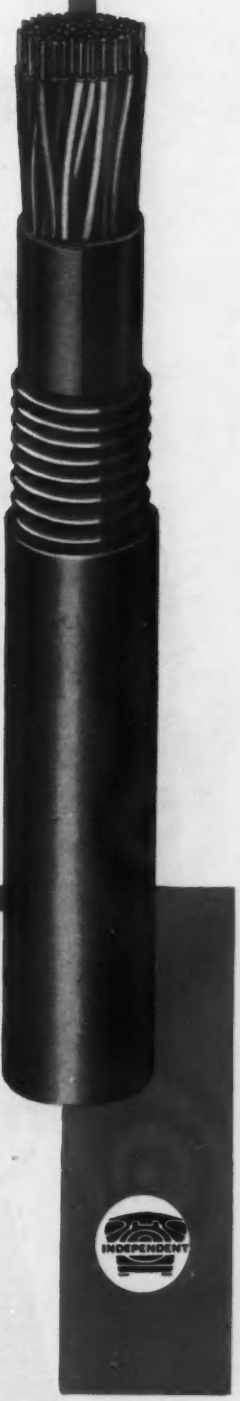

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"Important FCC Order Coming Up"

ULTIMATE GOAL of 10% return in Private Line Teletypewriter Services should be achieved in gradual steps, AT&T declares in final proposal in private line rate case; supports pre-reduction telephone schedules.

SUPPORTING the objective of the Western Union Telegraph Co. of a 10% rate of return for private line teletypewriter services, but taking the position that the ultimate goal should be achieved in gradual steps, the Bell System companies have suggested structural changes in private line telegraph grade rate schedules which they do not expect will take effect until the end of this year.

No increases in basic rates for teletypewriter services were called for at this time by the American Telephone & Telegraph Co. and Bell System associated companies, with the view expressed that "We think we should move from the present rates to the ideal (both level and structure), not at once, but in steps, suitably spaced, with each step working toward the ultimate objective."

For telephone grade services, AT&T and the Bell companies continued to support the rate proposal they presented in the Federal Communications Commission's long-standing private line rate investigation last summer, with one minor exception, dealing with telephotograph service rates.

The earlier rate proposal, still supported by the Bell companies, called for only one change from the rates then in effect — application of a uniform channel terminal charge and elimination of local channel and drop charges. During the same week that proposal was made, the FCC ordered a 15% reduction in Long Lines private line telephone revenues, and AT&T filed revised rates a month later.

ROLAND DAVIES, left editor of TE&M's "Washington Observations" is editor of "Telecommunications Reports," and FRED HENCK, right, co-editor of TE&M's "Washington Observations," is executive editor of "Telecommunications Reports," Washington, D. C.

The revisions, effective Aug. 25, 1958, which would generally be eliminated under the new proposal, resulted in an estimated revenue loss of between $9,000,000 and $10,000,000. They revised the interexchange channel mileage pattern to provide for a more rapid decline in rates relative to distance, and established the uniform channel terminal charge, and eliminated local channel and drop charges, as AT&T had suggested in its earlier rate proposal.

The final rate proposals, and supporting testimony, were transmitted to the parties in the private line case early in May, under a schedule agreement reached several months ago. The testimony and exhibits then will be offered in evidence as the three witnesses sponsoring them — AT&T Assistant Vice President Harold M. Botkin, Long Lines Department Chief Engineer J. R. Rae, and Dr. R. B. Johnson, Chairman of the Economics Department of Southern Methodist University — are presented for cross-examination in future hearings.

In their letter of transmittal, AT&T General Solicitor John T. Quisenberry, for the associated companies, and Long Lines General Attorney Ernest D. North said that "With respect to private line telephone grade services, we believe, as we have previously stated, that these services should earn in the neighborhood of 10%. The rate proposal . . . marked for identification on June 26, 1958, still appears desirable both as to level and, with one minor modification, as to structure. This proposal would restore a major part, but not all, of the reduction made effective in August, 1958, over our opposition, and is submitted as appropriate for the purpose of a final order in this case.

"With respect to private line teletypewriter grade services, Western Union has submitted rate proposals which would produce earnings on its services of about 10%. We agree with Western Union as to the proper level of earnings, but believe that objective should not be attempted in its entirety as part of the determination of this case.

"Only a few months ago (December, 1958) rates for these telegraph services were substantially increased. Consideration of the impact of further increases upon telegraph service customers leads to the conclusion that further increases should not be made until the present rates have been in effect for a reasonable period. Such a period is also needed to observe the effect of the rate schedules on development of the services."

Pointing out that the companies' views on the desirable future teletypewriter rate schedule are contained in Mr. Botkin's testimony, and making the comment that the ultimate objective for teletypewriter rates should be reached gradually, Mr. Quisenberry and Mr. North went on to state that:

"Under these circumstances, we would prefer not to submit a specific rate proposal for private line teletypewriter grade services until we have had further experience with the present rates. However, to meet our commitment and to enable the Com-

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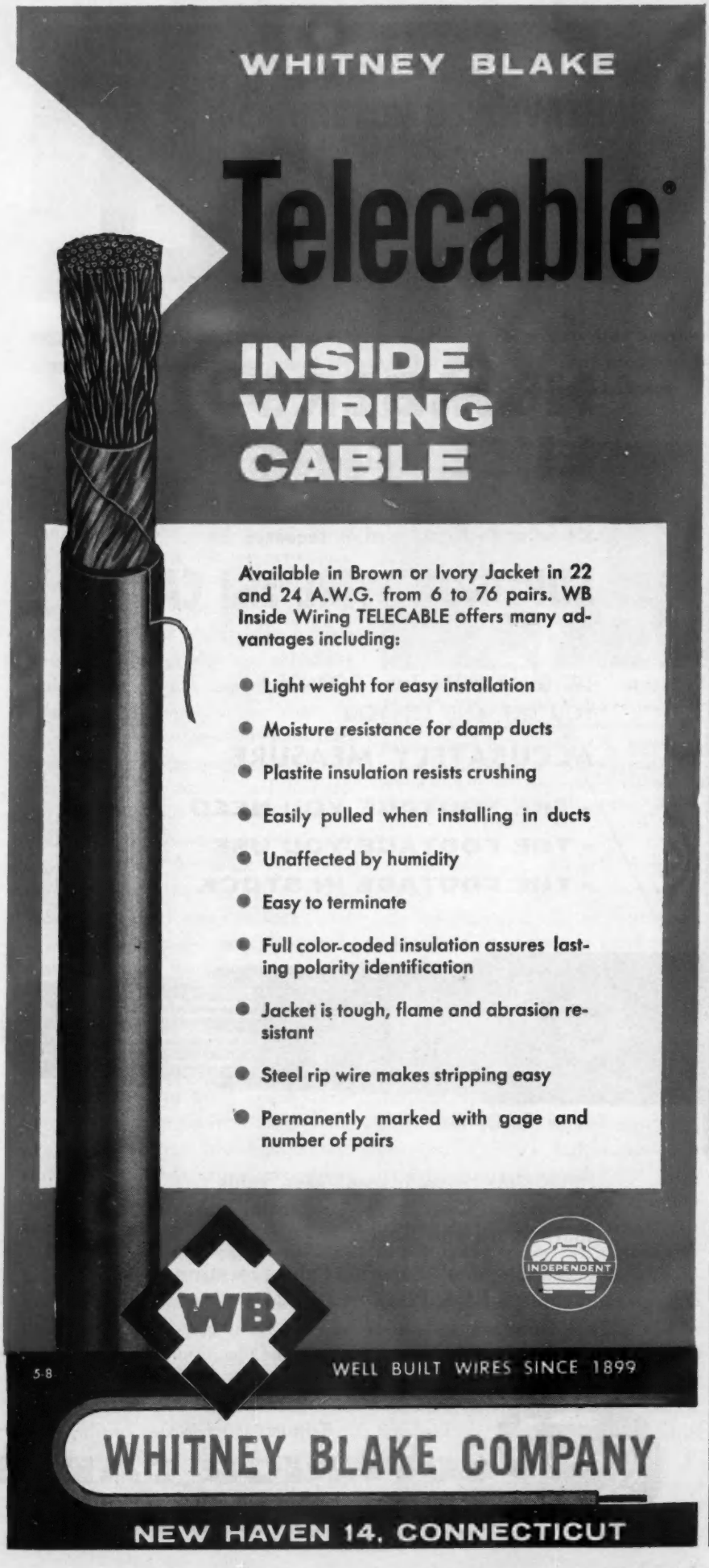
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mission to look toward a final order, we are submitting certain suggestions" in Mr. Botkin's testimony.

"These suggestions are aimed primarily at structural improvements and at the same time represent a step toward the desired earnings objective. Changes such as these could be made without increasing charges to any class of customers (commercial, government, or press) by more than about 4%. Since (as seems likely) a final order in this proceeding cannot become effective for a number of months, we would expect that such changes could not be made effective before the Dec., 1958, rates have been in effect for at least a year.

"Meanwhile, the Bell System associated companies have filed rates to be effective May 17, 1958, for both private line telephone and private line teletypewriter grade channels which conform to the Long Lines rates for these services now in effect. The overall effect of this revision is a substantial net reduction in charges."

With submission of the final rate proposals, the Bell System's evidence in the case is pretty well completed, except for a separate but related hearing on channels for data transmission purposes which is to follow the main part of the private line case. There will be, of course, substantial cross-examination of Bell System witnesses on the final rate proposal, with probably a good deal of it coming from Western Union.

The telegraph company, meanwhile, has pretty well completed putting it in its case. Still to come is most of the testimony by the multitude of intervenors in the case, although the chances are that many of them will not put in any direct case, but will rely on cross-examination and their legal briefs.

Thus, if an end to the protracted private line hearings is not in sight, there is now reason to believe that the end will come some time, which was a view held only by optimists a few months ago. There may be grounds for hoping that it can be wound up — the hearing itself, not a decision or order — by the time the FCC takes its annual recess.

Although the principal issue at

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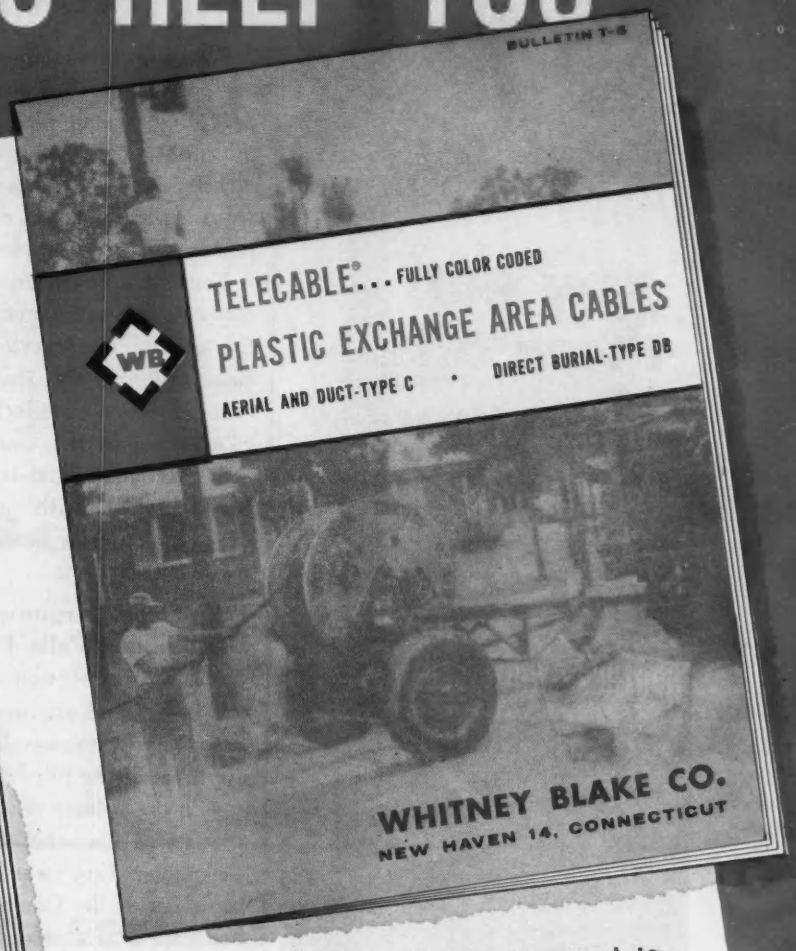
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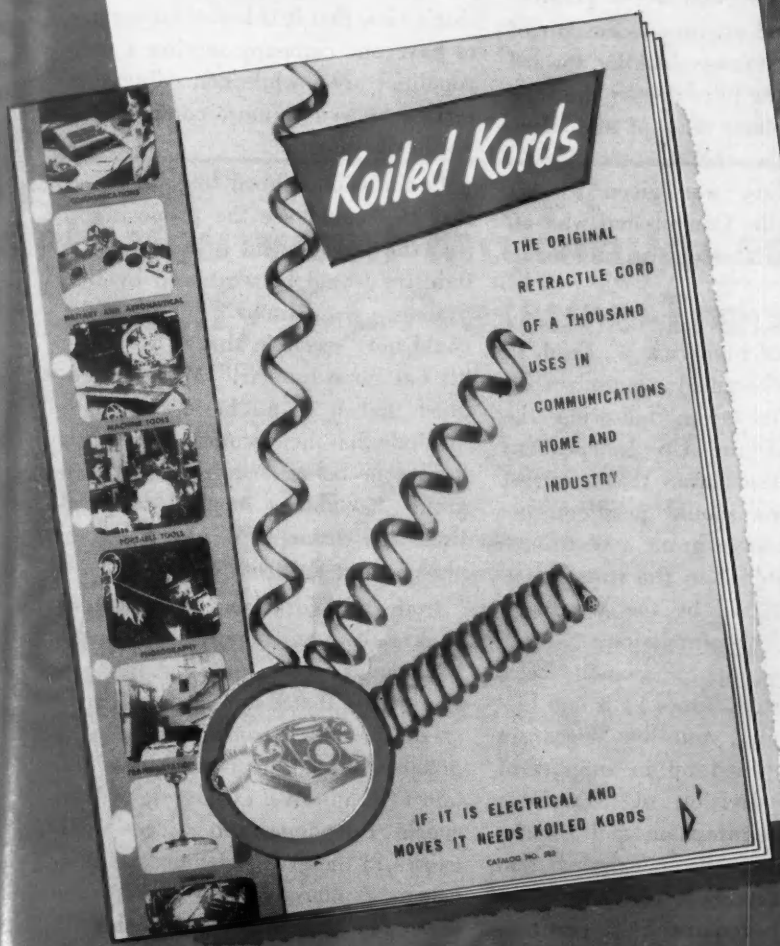
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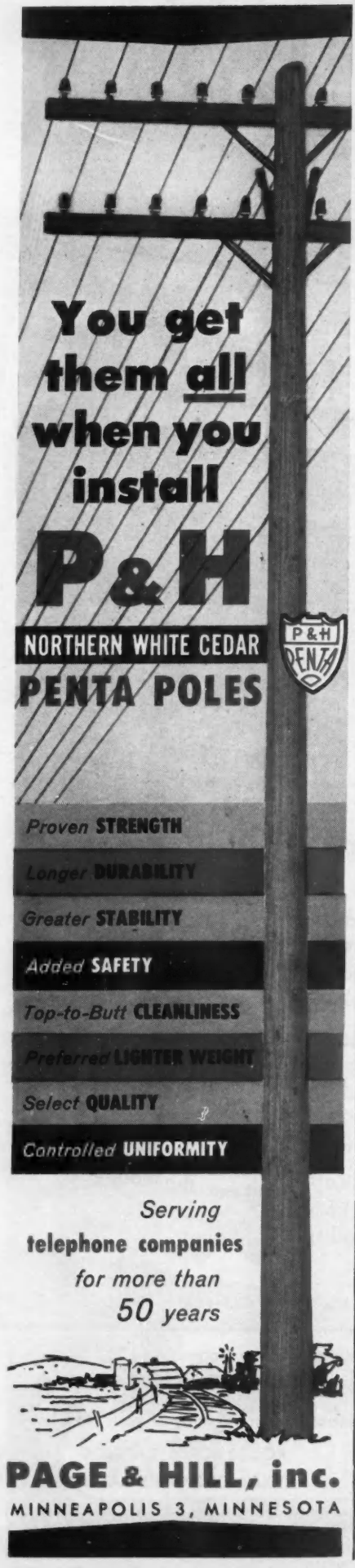

stake is the private line rate schedule of AT&T and the Bell System associated companies, the case is of definite importance to the entire telephone industry.

For one thing, many companies not part of the Bell System share in providing private line services, and the ability of the telephone carriers directly involved in the FCC case to get adequate rates is of obvious importance to their partners.

Even though it does not involve message toll rates, and is limited to the private line services, the FCC's final order in the private line rate case will have an effect on telephone ratemaking in the United States for years to come. That is why it is being watched with attention even greater than the amount of money involved warrants.

FCC Hears Arguments On Menomonee Falls Purchase

LITTLE indication of a possible reversal of an initial decision of two FCC examiners looking toward approval of the purchase by the Wisconsin Telephone Co. of the Menomonee Falls and Lisbon, Wisc., Telephone Cos. was given by six members of the Commission who attended a two-hour oral argument on the subject.

Chairman John C. Doerfer and Commissioner Frederick W. Ford, in particular, described themselves as having difficulty in following the argument of the US Independent Telephone Association that antitrust considerations should persuade the FCC to refuse to grant a certificate of public interest in the transaction, already endorsed by the Wisconsin Public Service Commission.

Spokesmen for Wisconsin Telephone, the Menomonee Falls and Lisbon companies, and the Wisconsin commission lined up in support of the initial decision of Examiners James D. Cunningham and Charles J. Frederick, who concluded that service advantages to residents of the area clearly require FCC certification of the proposed acquisition. USITA was alone in its objections to the initial ruling. The FCC Common Carrier Bureau, while it did not present a formal argument, had earlier supported the initial decision.

Main questions raised by the Commissioners during the appearance of USITA Counsel Bradford Ross centered on the contended status of the General Telephone Co. of Wisconsin as a "ready, willing, and able" purchaser of the properties; the effect on the residents of the area and the telephone service situation there if the Commission denies the application; and the absence of any objections to the transaction when it was before the Wisconsin commission.

Chairman Doerfer also questioned the participating counsel, particularly Mr. Ross, on the issue of whether it is better to have a single telephone company serving a "congested" metropolitan area. In this connection, William E. Torkelson, for the Wisconsin commission — who termed the Menomonee Falls area the regulatory agency's "number one" service problem — expressed the commission's view that it is better for service to have one company serving a metropolitan area, while conceding that service by two or more companies is physically possible.

Commissioner Ford told Mr. Ross that he "could see the proposition" that the Independent segment of the industry would be weakened by Bell Systems acquisitions, but that he could not "see it in this case," since "it has gone too far." Mr. Ross replied that it is a "basic error" to conclude that the circumstances which have gone before require the FCC to grant the public interest certification and exempt Wisconsin Telephone from antitrust considerations.

Both Mr. Torkelson and Nicholas J. Lesselyoung, appearing for the Menomonee Falls and Lisbon companies, said that Ralph Odegard, owner of the latter companies, faces a prospect that if he is unable to obtain FCC approval of the sale to Wisconsin Telephone, and service difficulties in the area continue, the Wisconsin commission will declare the area "open territory" available to anyone who will go in and provide good telephone service. — *Roland Davies & Fred Henck, editors of Telecommunications Reports," Washington, D. C.*

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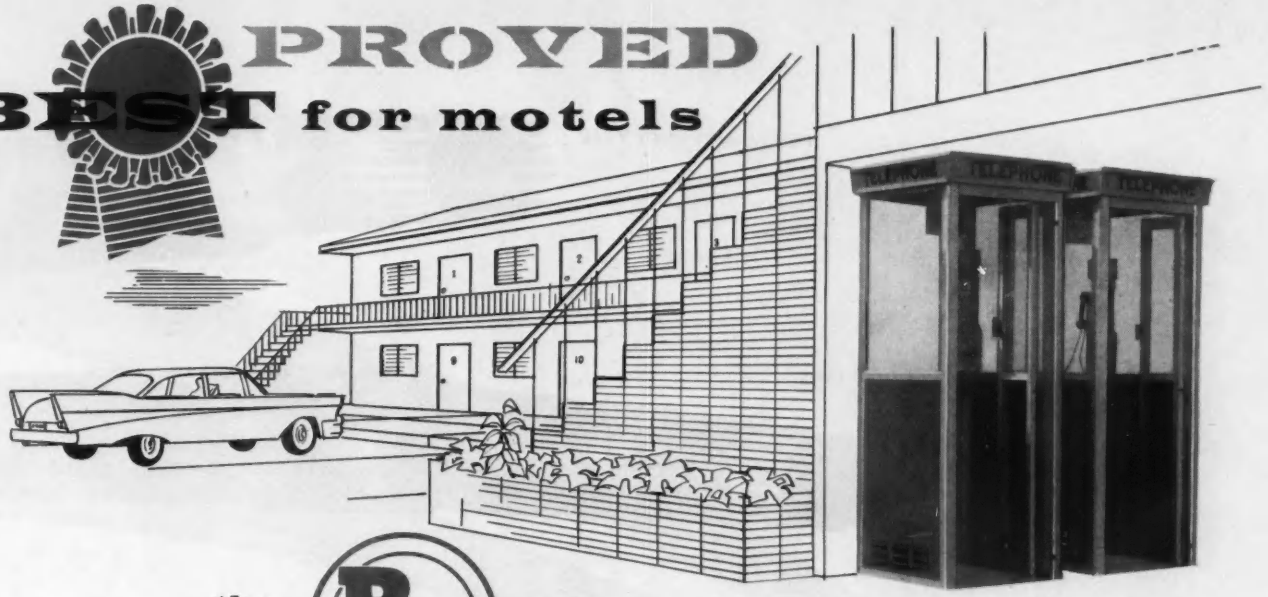

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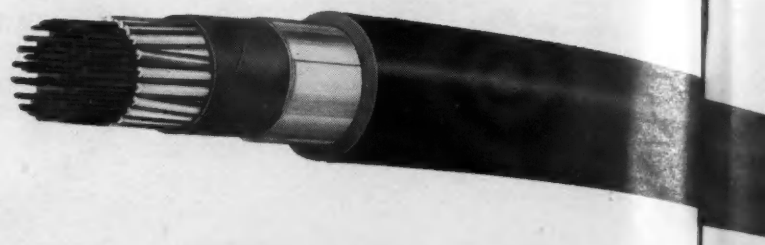
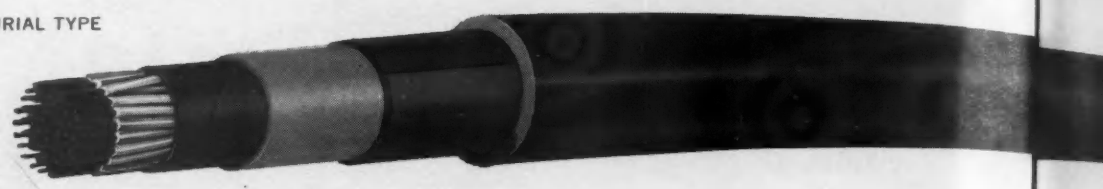


DIRECT BURIAL TYPE



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Exchange Area Telephone Cable

This Phelps Dodge cable, designed for aerial, duct and direct burial use, has a lightweight, thermoplastic construction—including fully color coded conductors—that makes handling easier and cuts installation time.

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- Interior Telephone Cable
- Rubber-Insulated Lead-Sheathed Telephone Cable
- Paper-Insulated Lead-Sheathed Telephone Cable
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EAND CABLE

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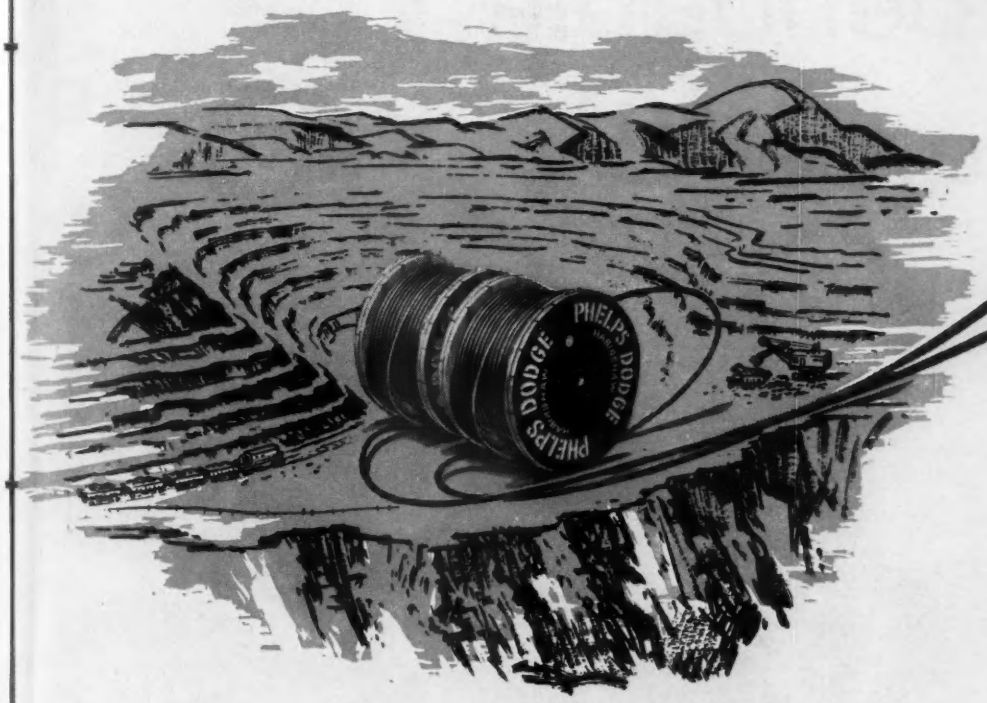

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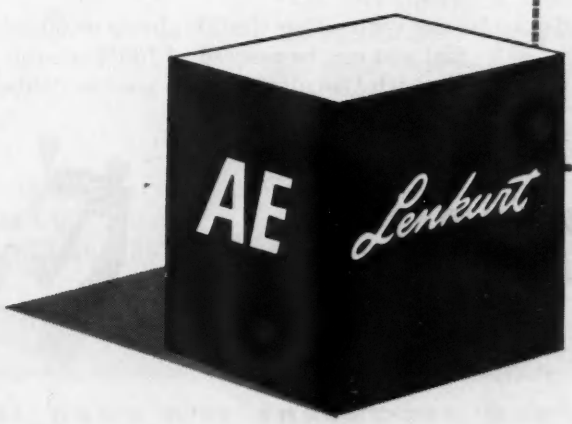

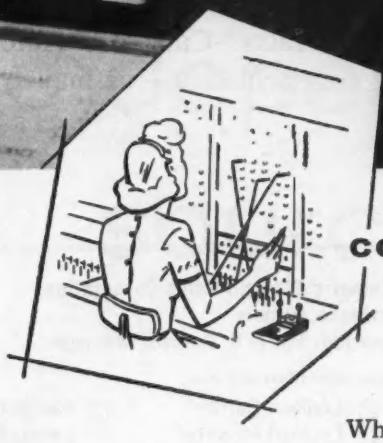

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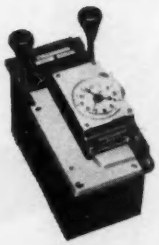
Why? Because they don't have to remember to stop and add 30-minutes to long conversations. This new 60-minute Calculagraph dial does it for them.

This new Calculagraph 60-minute dial assures you, too, of *all charges* due on every call. If you now have 30-minute dials, you can convert your Calculagraphs to the 60-minute dial.

Whether your needs can be met with either the 30-minute or 60-minute dial you can be assured of *100% accuracy* on *all toll calls* with Calculagraphs on *your* switchboard.

Write today for complete information.



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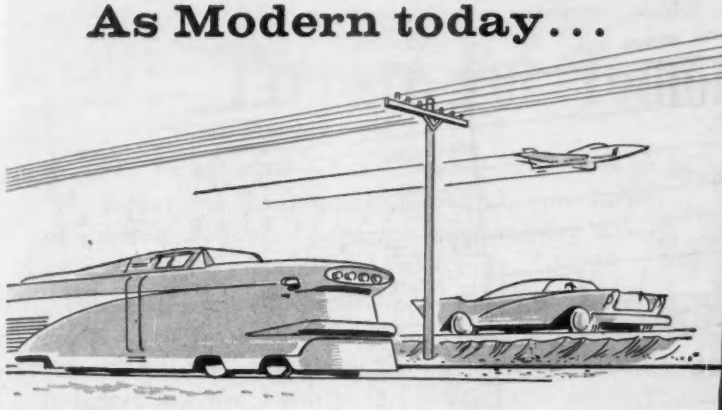
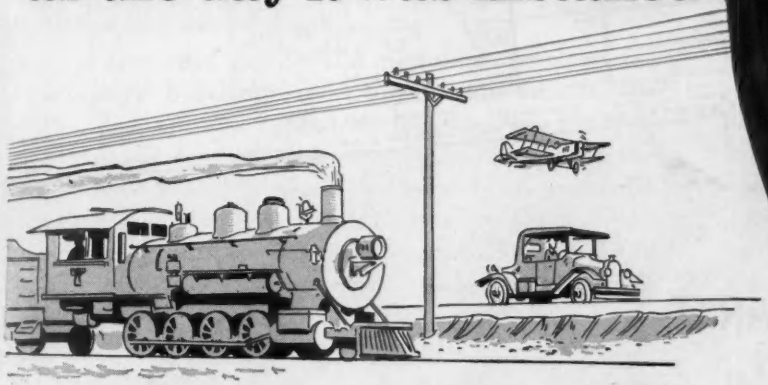
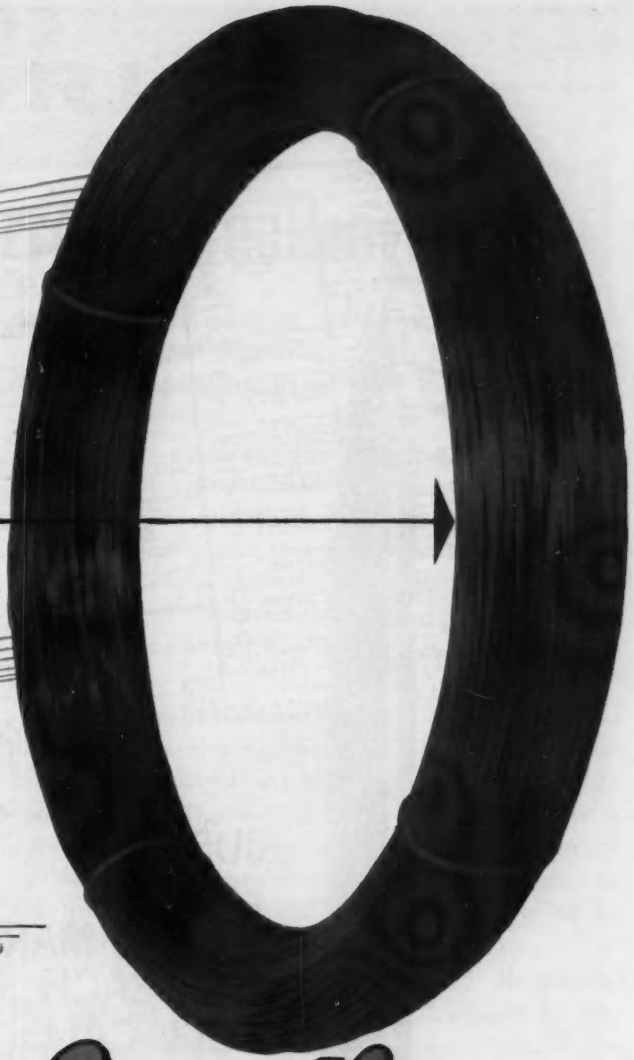


as the day it was installed





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Here's a line wire that refuses to grow old! Copperweld* Lines strung decades ago are still giving top performance. This long service life is possible because Copperweld has an ageless copper covering to prevent corrosion. And the rugged steel core, protected by the copper, assures permanence even under the most severe weather conditions, and provides strength for long-span construction.

Not only proved in past performance, but designed to stay modern for the future, Copperweld Line Wire is the best engineered conductor for voice, carrier and signal circuits. Write today for your copy of the Copperweld Engineering Data Book.

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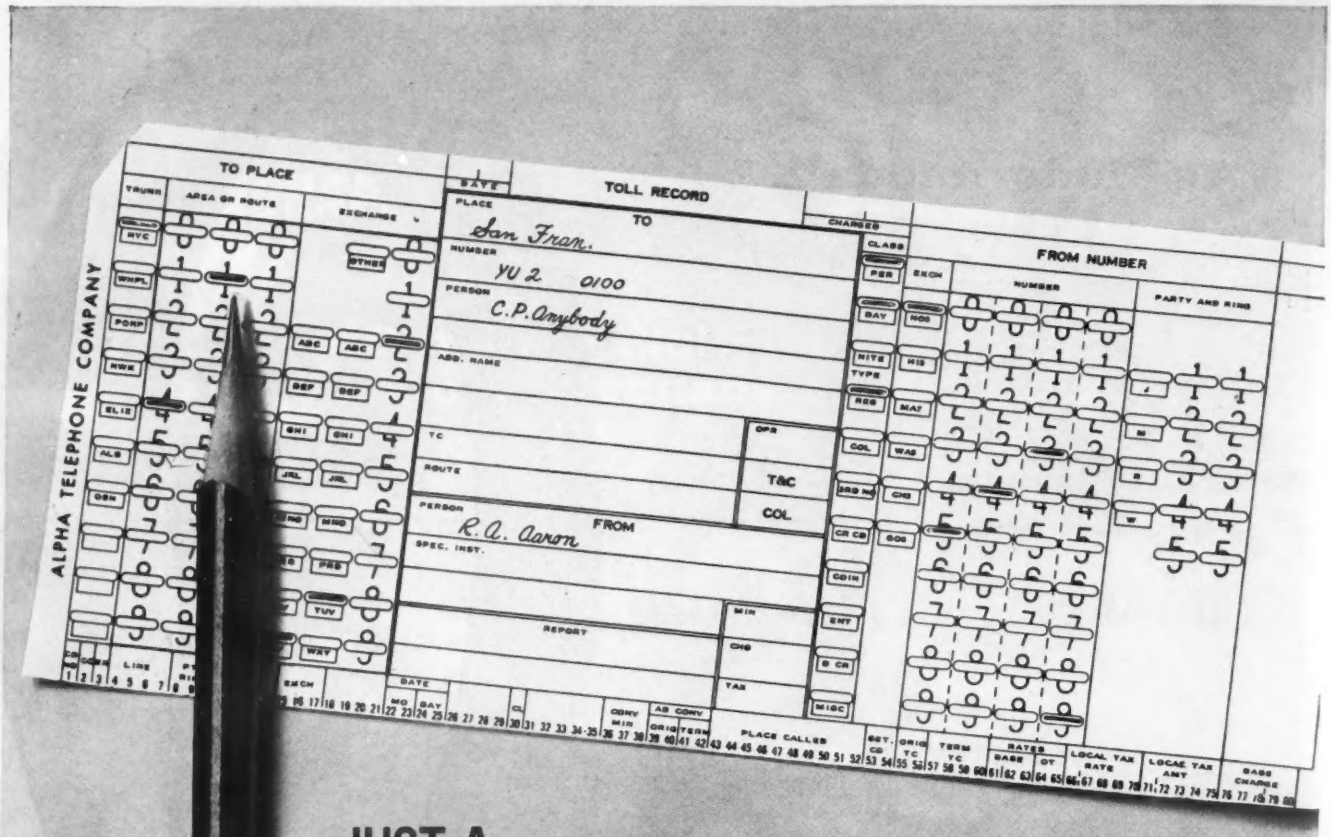

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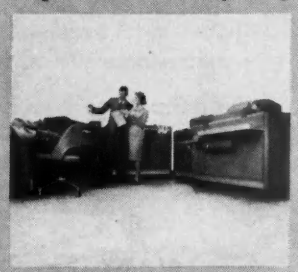

Through processing by IBM equipment, the pencil marks are converted to punched holes. Calls are automatically rated, amounts extended, and bills prepared.

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EDITORIAL

"Prepare For Tomorrow's Challenge"

LAST YEAR the United States Independent Telephone Association (USITA), sponsored its second annual *Telephone Engineering Conference* at Michigan State University.

We well know, the 1957 and the 1958 conferences lived up to the hopes of those who sponsored and designed them. Their impact on the industry has been and is important, and we feel the impact of future conferences will increase in importance as *more* operating companies participate in the program.

A few days ago USITA members received descriptive brochures and application blanks for the 3rd annual *Telephone Engineering Conference*, and we sincerely hope that by this time the brochures and other data have been carefully read, and Michigan State University knows your company will be represented at USITA's 1959 Engineering Conference at Kellogg Center on the campus of Michigan State University, East Lansing, Mich., June 28 through July 17.

Our review of the brochure from Michigan State University indicates the forthcoming *Engineering Conference* should be considered a "*must*" by all industry engineers.

We say this because we believe the program will (1) broaden and develop the engineer by accenting the use of engineering techniques and methods of economic evaluation to enable judicious management decision; (2) improve the conference participant's skills as an engineer; and (3) give him a better appreciation of both fundamental and engineering economics and their application to problems peculiar to the communications industry.

In keeping with the theme, "*A course designed to help engineers of all telephone companies get maximum utilization of every construction dollar,*" the program of the 1959 *Telephone Engineering Conference* will consist of these major segments:

(1) *Fundamental Economic Concepts.* Our copy of the Conference brochure tells us this important section will concentrate on providing the engineer with facts on subjects ranging from the changing American economy and sources of economic expansion and growth to problems of underdeveloped countries, and the world economy in transition.

(2) *Cost Considerations In Engineering Decisions.* This course addresses itself directly to such issues as cost behavior, fixed and variable costs, average costs and differential costs, joint costs and their allocation, revenue considerations, evaluation of estimating data, risk and uncertainty, and factors not adaptable to monetary evaluation.

(3) *Engineering Fundamental Plans.* This section is aimed at providing the engineer with information that will enable him to take available and possible alternatives and select from them a pattern of plant development simultaneously capable of meeting current needs and providing a foundation for logical and orderly growth to the ultimate requirement.

(4) *Communicating Engineering Decisions.* This section has been carefully designed to improve the engineer's ability to communicate his ideas to his superiors, co-workers, and, when the need arises, the public.

(5) *Engineering Viewpoints.* We well know a look into the future is always of great interest to the engineer and in this section leading authorities will give the conference participants a glimpse of coming technical advances.

It is our sincere belief that any company, regardless of its size, can increase its efficiency, improve its position, and get constructive help from the M.S.U. conference.

Of course, we hope your registration has been mailed. However, since applications will be received through *May* 22, we believe there is no better time than *now* to take a major step toward "*Preparing For Tomorrow's Challenge.*" And in our opinion you'll take that step when you mail your application for admission to the USITA *Telephone Engineering Conference* to *John U. Jeffries, Assistant Professor, Electrical Engineering Department, Michigan State University, East Lansing, Mich.*

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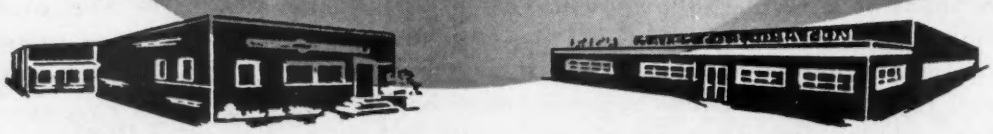

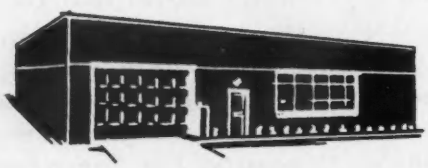

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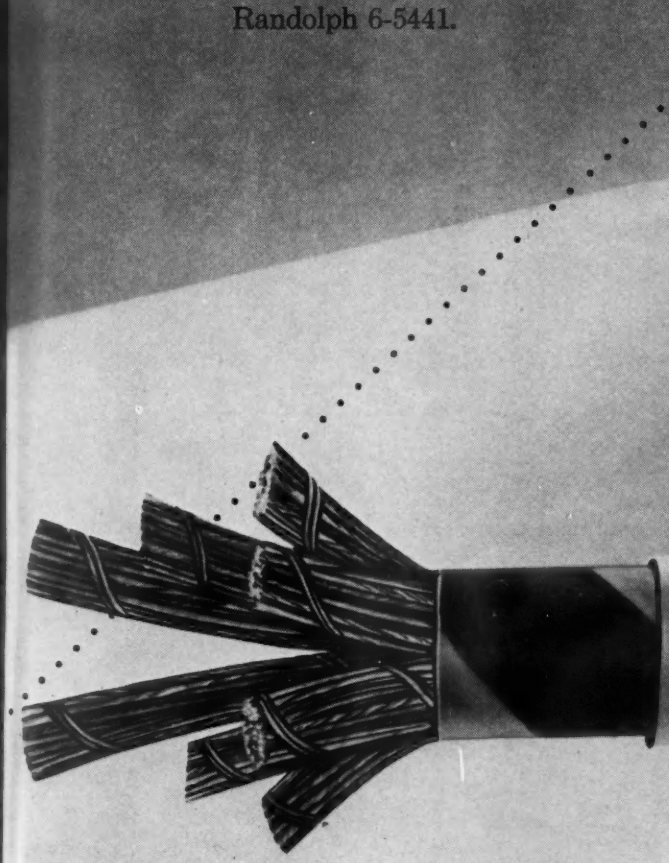
When you have an emergency order, call our office. You can be sure that Leich will, as always, do its utmost to give you the best service possible.

Contact your Leich representative today, or call us at Leich Sales Corporation, Chicago. Our telephone is Randolph 6-5441.



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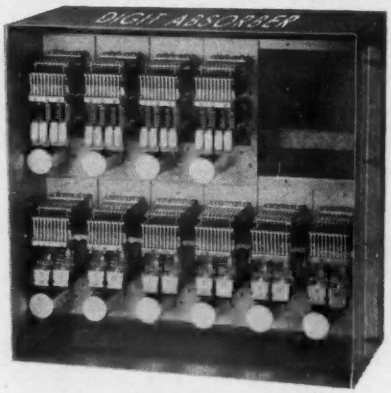
manufacturers of telephones, switchboards and related apparatus since 1907

INVESTIGATE UNIVERSAL DIGIT ABSORBER*

FOR CONVERTING EXISTING SWITCHBOARDS INTO FULL 2-5 NUMBERING



Digit absorber case requires 17″ on a 19″ relay rack. Capacity 12 units.

Other ***UNIVERSAL*** Equipment:

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Code-to-Selective RINGING CONVERTER
TRUNK DIGIT REGISTER

DIRECT DISTANCE DIALING REQUIRES A 2-5 CODE

Few dial switchboards of earlier design have provisions for adding digit absorbing features economically. The Universal Digit Absorber fills this need easily and at nominal cost. Installation requires very little time and does not interrupt service.

The ever-increasing requirements of Extended Scope Dialing on a universal numbering arrangement are easily handled by the Universal Digit Absorber. The Digit Absorber is a factory assembled, fully-wired, applique unit that can be connected to any existing dial switchboard to pad in three digits of exchange code (ABX) or four digits in the case of a three digit dial board.

There are two types of Universal Digit Absorbers, depending on the complexity of the exchange codes assigned:

19-S unit will handle exchange codes, as illustrated by AB-X, where the "X" digit is not a duplicate of the "A" or "B" digit.

19-L unit is required where the "X" digit is a repeat of either the "A" or "B" digit.

In addition, Universal offers a Trunk Digit Register which can be applied to "Trunk on Line" dial boards where five or more digits are required to be delivered to a 3 or a 4 digit tributary exchange. This unit also affords added link hunting time and safeguards against partial digit registration.

* Pat. Pend.

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"As long as the cost of adding or replacing productive units exceeds the average cost of those already in service, indirect attrition will continue to exert its downward pressure on rate of return."

The ANATOMY of ATTRITION

By P. M. SCHUCHART*

That utility rates are made for the future is axiomatic. How this can be accomplished, though, is far from axiomatic. This is especially true when regulation must deal with attrition.

ATTRITION . . . the wearing down, as of resources, by continual slight impairments." (*Webster's International Dictionary*). With changing times, a word can take a changed application and meaning. Old Noah Webster, if reincarnated as a public utility regulator or manager, would ruefully recommend the inclusion of yet another definition —

"Attrition . . . The wearing down, as of return, by continual — and not so slight — inflation."

This description would be all too well understood by those engaged in any business activity today. But to those in the public utility field, it would carry a particularly distressing connotation.

The downward pressure on rate of return exerted by inflation-generated cost increases hits all business, both regulated and unregulated. To the extent that a reduction in return cannot be offset by other factors (such as increased efficiency), the level of return can be maintained only by increasing the price charged for the goods or services produced.

In the case of an unregulated business this can be done at will — always provided competition will permit; and the postwar profit picture demonstrates on its face that competition has permitted this — and more. Generally speaking, the return levels of unregulated businesses have not only been maintained but have been increased sufficiently to make up for the decreased purchasing power of the earned dollar.

In the case of a public utility the required price increase can, of course, be made only with the approval of the regulatory body having jurisdiction over the rates. This procedure in itself opens a Pandora's box of difficulties and problems which plague utility regulators and managers alike.

But such troubles are multiplied by yet another factor. As will be brought out, attrition in the rate

Next page, please

**Mr. Schuchart is Director, Engineering Dept., Florida Railroad & Public Utilities Commission.*

of return of a typical public utility occurs in a markedly different manner than in other business. Because of this difference, making the required adjustment in utility service rates becomes an unusually complicated — and painful — task. It is a task, however, which is not *insurmountable.*

Coping with attrition calls for a full understanding of its nature. Mere recognition of its existence and its primary cause are not enough. To this "what" and this "why" must be added "how." Knowledge of *how* attrition functions is a fundamental requirement. This might be termed the anatomy of attrition.

Rate of return is, of course, a percent. It is calculated by dividing the dollars of earnings derived from a year's operations by the dollars of "permanent" assets devoted to those operations (the "rate base" in utility terminology). Thus there are two avenues for attack on rate of return, directly through earnings and less directly through the base. Attrition works along both.

When current operating expenses are pushed up, say by a hike in wage rates, dollars of earnings go down (in the absence, of course, of an offsetting price increase). The impact on rate of return of each individual cost increase of this sort is felt immediately — and in *full.* There are some who feel that this kind of decrease in rate of return does not fall under the meaning of the word attrition as used in its purest sense. However for purposes of this article (and with no presumption of ruling on the question) I would like to apply the term "direct attrition" to the immediate and full impact on return resulting from such operating expense increases.

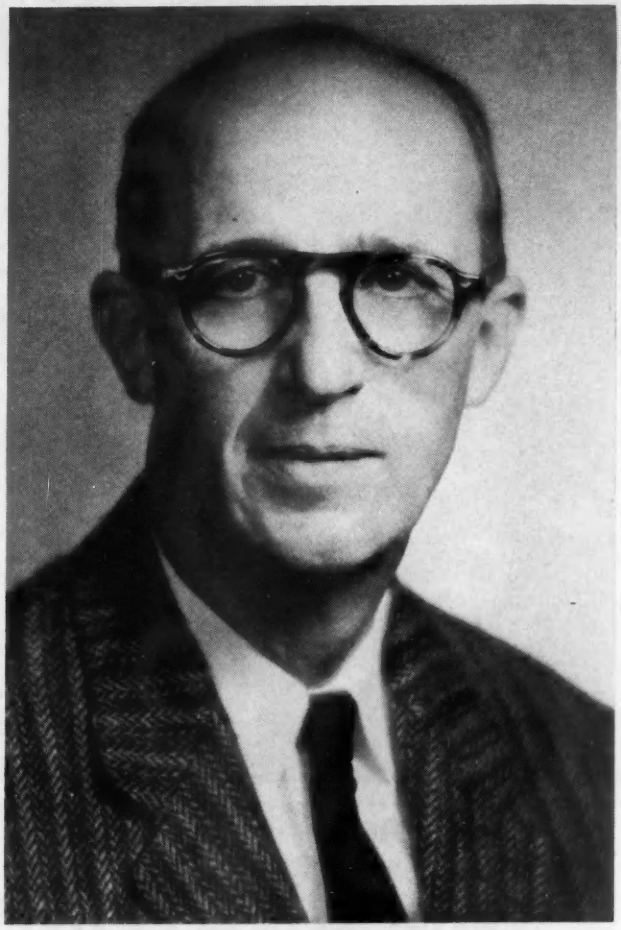
Indirect Attrition

ON THE other hand, what might be termed "indirect attrition" is primarily generated by inflationary changes in assets — the base or divisor part of the rate of return calculation. A business adds (or replaces) a productive unit at a cost higher than the average cost of existing productive units. If the earnings derived from the new unit are the same as the average earnings per existing unit, the overall rate of return will be forced down.

Moreover, earnings from the new unit will almost certainly be *less* than the average per existing unit, and the impact on rate of return will thereby be compounded. There are accompanying expense increases which tend to bring this about. Because of the higher dollar cost of the new unit, depreciation expense will be greater than the average per existing unit. The same may also hold for ad valorem tax expense.

Thus this "indirect attrition" manifests itself through *both* components of rate of return, although the primary cause is a change in the base.

Of course, if the new productive unit is more efficient and the earnings derived from it go up at least in proportion to its higher cost, there will be no effect on overall rate of return. Business management has made every effort through improvement in design and construction to do just this. In some instances outstanding success has been achieved, at least for short periods. But the inexorable march of inflation has been too much even for research and our American know-how. By and large, the eventual offset to the high cost of growth and replacement has been recourse to price increases.



The Author, P. M. SCHUCHART, is responsible for the service and rate features of the electric, telephone and gas utilities under the jurisdiction of the Florida Railroad & Public Utilities Commission.

Direct & Indirect Attrition

PROBING deeper into the anatomy of attrition we find a fundamental difference between the "direct" and "indirect" forms. As previously stated, the *full* effect of each specific increase in a company's operating expenses is immediately reflected in rate of return; and until there is another specific increase, there is no further "direct" attrition.

But the depressing effect on rate of return that comes about with the addition or replacement of plant and equipment is a continuing, day-in day-out matter. Moreover, this form of attrition will be continuing even in the absence of further inflation. As long as the cost of putting in additional or replacing productive units exceeds the average cost of those already in service, indirect attrition will continue to exert its downward pressure on rate of return.

Although far from being happy about it, the public can clearly grasp the reason for an upward price ad-

Please turn to page 81

Broader Service Horizons — Data Transmission

By V. N. VAUGHAN, Jr.*

Data and Teletypewriter Planning Engineer,
American Tel. & Tel. Co. New York City

DIGITAL DATA TRANSMISSION

	BANDWIDTH (CYCLES)	BITS PER SECOND
TELETYPEWRITER (60 WORDS PER MINUTE)	170	45
TELEPHONE CIRCUIT	3,000	600-1,000-?
RADIO PROGRAM CIRCUIT	15,000	8,000
VIDEO CIRCUIT	4,000,000	1,000,000

ABOVE FIGURES ARE ORDER-OF-MAGNITUDE INDICATIONS FOR CHANNELS. TERMINAL EQUIPMENT IS NOT INCLUDED.

CHART NO. 1

ONE OF THE most interesting and exciting things which we can do is to speculate on the future of communications. Let us take a broad, long-range look at the telephone industry and its future growth. Certainly we in the U. S. can be very proud that we have achieved the highest development of the telephone business of any country in the world. With about 80% of our U. S. homes and practically all of our business and industrial locations now equipped with telephones, we can be justly proud, but not complacent. Where do we go from here?

Historically, any big industry seems to go in either of two directions, up or down. Consider for example, the wagon and buggy industry. It grew up a pinnacle of success and then deteriorated. However, at least one company considered itself to be a manufacturer of "vehicles for personal transportation" rather than just a wagon builder. Although there may be some debate as to whether this company made the decision early enough, it nevertheless did make a successful transition to the production of automobiles. Historically, an industry seems always either to continue to grow, or else to diminish, in its importance in the over-all economy. It appears virtually impossible for a big industry to "level off" and stay that way.

Certainly there is no inclination on the part of anyone in our business to want to "level off." Such an attitude has never been the part of the telephone tradition of service. We have been so busily occupied that we probably could not level off even if we wanted to. The industry has been developing and applying new carrier systems, new microwave transmission systems and is now hard at work on electronic switching. With such systems, which permit us to do our job better than we have in the past, we are essentially lifting ourselves by our own "electronic bootstraps."

**Mr. Vaughan presented this paper at the* 1958 *USITA Engineering Conference.*

Nevertheless the pattern of the times in which we live does affect the manner of our growth. Our future growth is much more likely to be horizontal than vertical, that is, a greater growth in usage rather than continued growth in the number of telephones. Although there are more homes with two cars in the garage than there are with two telephone lines, and, although there are still a number of farms yet to be served, the simple fact of 80 per cent development of the home market (and a higher development of the business market) suggests that our growth pattern will inevitably be in usage.

Of course, considerable increase in usage will result from social and economic forces — people traveling about the country so much more than ever before, and relatives living in more widely separated locations. In addition, the need for data transmission is a specific aspect of this growth in usage which promises to become a major factor in our business.

There have been many predictions by well-informed people, such as at a recent Joint Computer Conference, that within the next 20 years the usage of telephone circuits for data transmission will equal their usage for ordinary voice communications. While some telephone people feel that this estimate is a little exaggerated, the consensus of informed opinion is that there will be a tremendous upsurge in the use of telephone circuits for machine-to-machine "talk."

Automation of Information Handling

THE MANUFACTURING industry has developed the automation of materials handling to a very high degree. Similarly the business machine industry is now developing the automation of clerical operations — the handling and processing of information. Experts agree that business and industry are just beginning to clearly understand and to substantially use mechanical-electronic data processing. IDP will accomplish for "paper" work the same streamlining that has resulted from the production line for materials handling.

Some of the same information that now flows over our circuits on a person-to-person (voice) basis will, in the future, be transmitted as "data" from machine-to-machine. Further, as IDP (*I*ntegrated *D*ata *P*rocessing) develops, much of the data which now travels by U. S. Mail will flow over telephone circuits. This is our job to provide the "I" in "IDP" — to integrate, to tie together the various locations, somewhat like the way our nerves connect our muscles to our brain.

When we listen to our customers we hear many urgent requests for data communications. It is no longer a question of whether telephone circuits can be or will be used for data transmission, but only a question of how best to provide for the use of these circuits for data transmission. Each of us share in the responsibility to meet this service need. Fortunately, the telephone industry has a considerable wealth of experience in providing facilities for telemetering, teletypewriter, facsimile, television, etc. We have both the basic facilities and a vast resource of know-how and capability upon which to draw.

Type of Facilities

IN SEEKING methods of meeting this new responsibility, it is appropriate that we review existing service offerings and the kinds of facilities which are available. Examining this chart (*Chart No. 1*), and reflecting on the costs and charges for the grades of facilities shown, we conclude in general that the bigger the pipe (i.e., the greater the bandwidth of the channel), the lower the cost will be for transmitting a given volume of data. The customer can send more "bits per buck" over the wider bandwidth channels.

The term "bit" is a contraction of the words binary digit. It might be called the smallest possible piece of information, either a "yes" or "no."

While most of current data systems are binary digital data systems, it is by no means sure that the next generation of progress will not return us again to a point where analogue systems will be in the ascendency. Today, however, the digital systems are generally more attractive.

Even for the transmission of speech, telephone research people are looking very favorably at digital (pulse modulation) systems. We may find our telephone plant of the future increasingly using pulse techniques for both transmission and switching. "Time division" shows promise of replacing "frequency division" (carrier) and "space division" (switches).

The conclusion we draw from this chart is most natural, for things nearly always come cheaper in big volumes. There are, of course, always exceptions to this

Please turn to page 86

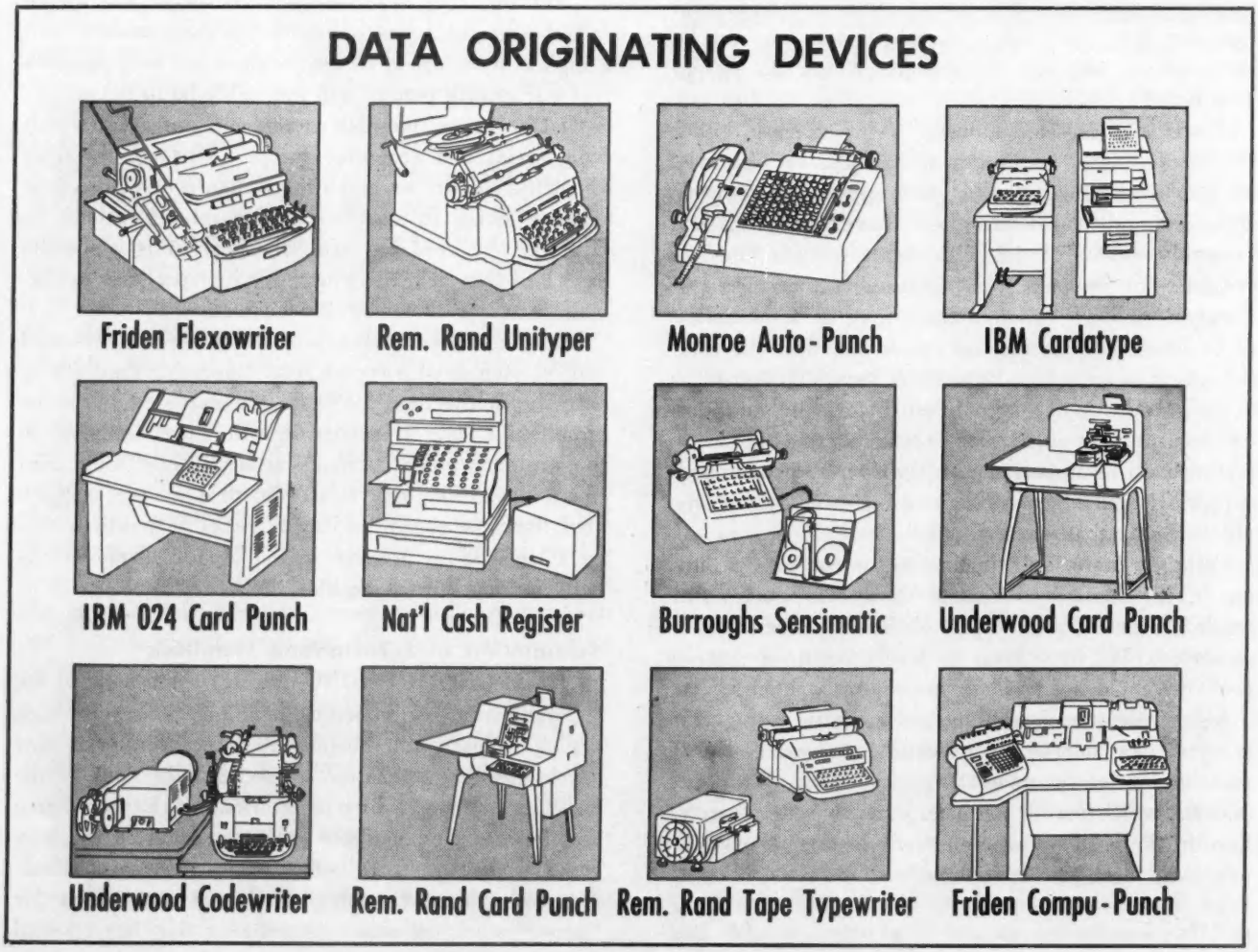
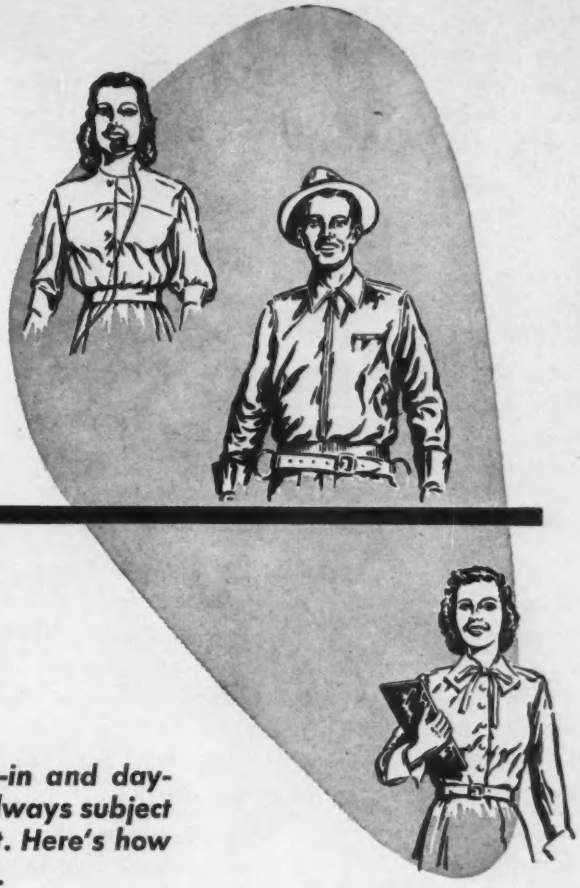


CHART TWO: — Data originating devices.

Lessons In Management: Part Eight

Need "Hypos" For Your Staff?



By ERNEST W. FAIR

Although company routines must go on day-in and day-out the operating efficiency of the worker is always subject to fluctuations — good one day — low the next. Here's how some managers meet the problem.

"THOSE 'pep pills' are good stuff under some circumstances. Too bad they are not suitable for use on the people who make up my staff. There are times when I certainly need something like that to get anything done around here!"

When a telephone company executive made that remark we had to agree with him for he had hit one of the top problems of any business executive — a problem caused by the fact that although the routine of the organization must go on day-in and day-out the operating efficiency of the human being is always subject to fluctuation.

Unfortunately there are no satisfactory medical "hypos" to stimulate associates, staff personnel and others whose continued energy is required. We must depend on other means.

There are some other stimulants the telephone company executive can make a part of his firm's routine so the occasional decreases in operating efficiency are reduced to a minimum.

Most of the stimulants are simple procedures. Here are a few:

Stimulate The Inborn Desire Of Every Individual To Build and create whatever he does. Where individuals have this stimulation much more productive effort ensues. On the other hand, where it has not been exploited by the executive in charge only the more ambitious personnel will use it in their work.

Arousing employe interest in the job to be done by showing how the satisfactory performance of each job helps the company accomplish its goals helps the supervisor turn the worker's inborn desire to build and create into productive effort. When work has such an appeal the employe will do it better, with more imagination, and with less error. When the work is unappealing, only routine chores are accomplished.

Stimulate Curiosity But Direct It Along Proper Channels. The executive who causes employes to ask questions about how the job is done, how it can be done better, and about the company and its work has a real "work stimulator" working successfully for his company.

Stimulate The Feeling Of Ownership. Such feeling is vitally important in today's business structure. There is too much emphasis on "capital" and "labor" being opposed to one another today. It permeates every branch of business and industry and it is as wrong as many other such demagogic shoutings.

Every employe has a direct interest in the welfare of his company and in the job the company is doing. That interest concerns itself with the pay check the employe receives for his efforts. Too little promotion has been given to the pay check as a company "dividend" for the employe.

Any and everything we can do to promote the feeling

of ownership on the part of the employe will be to the advantage of all concerned. Having a pride of possession is automatic assurance of a job better accomplished. When people on the staff start thinking and talking in terms of "us" and "our" company then we know no "hypo" of this nature is needed. When these words are never heard it is time to inject the stimulant.

Stimulate The Assurance Of Fair Treatment by the example set in daily handling of employe problems. All workers tend to put forth extra effort for the people they like and count as friends and they have the same stimulation toward any group or organization they believe carries the badge of friendliness and fairness. Better effort always comes when people feel sure of the fair treatment from company executives.

Stimulate The Instinct To Imitate Those We Admire. All humans are affected by this factor and when the executive notices a marked drop in efficiency of those under and around him he can be certain little of this admiration exists insofar as he is concerned. Then and there is the time for the executive to change his personal and business habits and work hard to gain the respect and admiration of his employes.

If we expect forceful drive from our associates we must demonstrate it ourselves. If we expect cheerfulness and drive all through the day we also must practice these traits. The same thing applies to any and all desirable working traits we expect from our staff.

Stimulate The Desire To Learn. This desire has been implanted in all of us from our earliest days and very few men and women lack this quality.

When the desire to learn has been kept alive at all times then we have a staff that does a better routine job and comes up with those individual suggestions and ideas which are so necessary to any executive's successful accomplishment of his own work.

"Here is a problem, Henry, wonder if you would give it some thought???" "This is something new coming up, Tom, will you look into it and find out the facts behind it???" These are just two methods an enterprising executive can use to employ this stimulant.

Stimulate Action Through The Use Of Force — *But — use it correctly.* Others welcome forceful leadership. We follow it in every facet of our daily lives from church to politics so why shouldn't the executive use it in business also?

Proper use of force is best set forth in those two words mentioned above — *forceful leadership* — not the exercise of physical pressure or other types of force. Try being uncertain, lazy and lacking in decisiveness yourself and the staff will follow suit.

Stimulate Competition By Reward through victory not by pitting one member of the staff against another. There are all kinds of competition in business — one individual against another, one department against another, and our own company against another. The best of all, however, is stimulation of competition against standards, quotas, and the pure and simple pleasure of achieving something worthwhile. All are easy to employ and direct properly in any organization.

Stimulate Action Through Improving The Working Atmosphere which surrounds the individual staff member. Dreary and miserable surroundings never encourage good effort. Stern and harsh departmental rules create an undesirable working atmosphere. When working conditions are pleasant employes have a greater desire to do the job and the good working conditions definitely stimulate increased activity and the development of ideas.

Any and all of the foregoing "hypos" can be employed by the telephone company executive who finds work efficiency within his specific staff declining. They are the stimulants which will bring forth the responses he desires.—*Ernest W. Fair.*

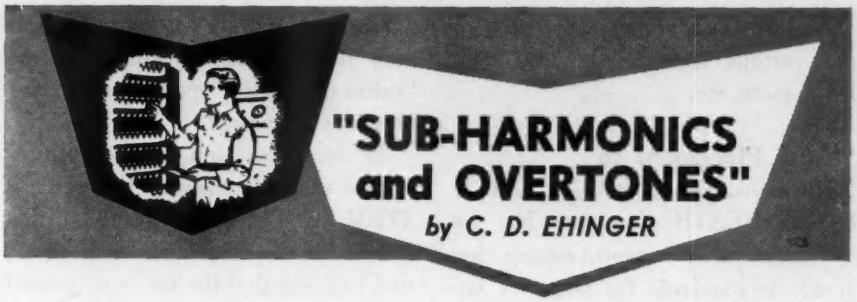
Book Review

"Electronic Communication," by Robert Shrader; 937 pages; 6 x 9; $13.00. Order from Educational Division, "Telephone Engineer & Management."

DESIGNED especially for courses of study leading to an FCC license, *"Electronic Communication"* is also a very complete work concerning all practical applications of electronics.

Written for the person who has a minimum background of mathematics, this book can be an invaluable aid to every person involved in any phase of the electronic field.

TELEPHONE ODDITIES
RUTH-GET THE AGRICULTURAL AGENT ON THE PHONE-QUICK!
BY DIALING PI 6-6555 IN NASSAU, N.Y., GARDENERS MAY GET INFORMATION ON PROBLEMS SUCH AS LAWN CARE, INSECT INFESTATION OR DISEASE CONTROL-THE INFORMATION IS ON RECORDINGS MADE BY THE AGRICULTURAL AGENT AND HIS STAFF-THE MESSAGES ARE CHANGED DAILY-
THE TYPICAL TIP GOES SOMETHING LIKE THIS:
"WHY DO THE BLOSSOMS OR FLOWERS FALL OFF MY TOMATO PLANTS? THIS IS A COMMON QUESTION FROM GARDENERS-THE BLOSSOMS FALL OFF IF WE HAVE A PERIOD OF COOL NIGHTS. THE BLOSSOM SHOULD BE SPRAYED WHEN FULLY OPENED-DO NOT SPRAY THE LEAVES-TOMORROW WE WILL TALK ABOUT LAWN AND GRASS DISEASES. HAPPY GARDENING!"
AT LEAST ONE SPOT GIVES A VACATIONER SOMETHING FOR NOTHING. ON THE ISLAND OF ARUBA IN THE NETHERLANDS ANTILLES THERE ARE NO PAY TELEPHONES-THOSE ON STREET CORNERS OR ALONG HIGHWAYS ARE FREE TO ANYBODY WHO WANTS TO USE THEM.
TOM HIGGINS JR.
FREE PHONE



A Wide-Band Audio Voltmeter

A TE&M LAB REPORT on the construction and performance of the Heath AV-3 Audio Vacuum Tube Voltmeter for use in the central office equipment room.

AS POINTED out in a previous article (*March* 15, 1959 *issue of TE&M*) the standard vacuum tube voltmeter is the "work horse" of the central office equipment room. However, in making voltage measurements of small magnitudes and, especially, when making transmission measurements, the standard vacuum tube voltmeter does not have the sensitivity required.

A meter capable of making accurate measurements, in the milli-volt range, is available from the Heath Company, Benton Harbor, Michigan. Arrangements were made with this organization to furnish its Model AV-3 Audio Vacuum Tube Voltmeter kit for the purpose of a *Telephone Engineer & Management* article concerning its construction and adaptability for telephone central office work.

ILLUSTRATION A: — The completed Audio Vacuum Tube Voltmeter — (Heath Company).

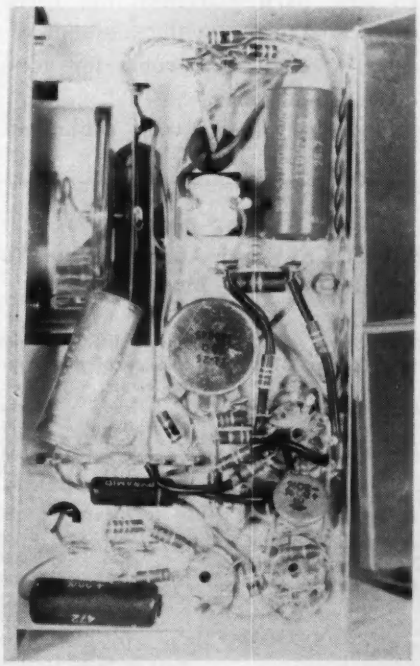


ILLUSTRATION B: — Parts placement is quite compact and yet allows sufficient room for easy maintenance. — (TE&M Lab Report)

"Follow Each Assembly Step"

THE KIT arrived through the mail with no damage in shipment. Packaging is secure and protective. The instruction and assembly manual is thorough and complete, and assembly of the instrument will present no problems to the telephone technician. The usual precautions should be followed — it is much better to follow each assembly step in exact accordance with the construction manual, and the usual hand tools found in the telephone equipment room are more than sufficient, with the exception that a small soldering iron, in the 40 to 60 watt category, should be used.

I was unable to obtain information from the Heath Company as to their experience concerning the usual construction time required for assembly. Working at a somewhat leisurely pace, the instrument was completely

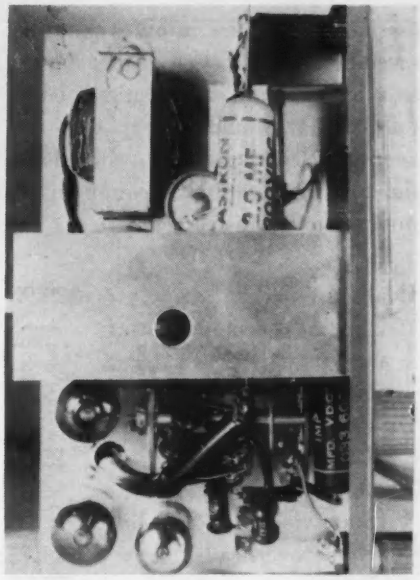


ILLUSTRATION C: — Tubes are placed in a position for easy replacement. The opening in the side of the aluminum support bracket is for access to the calibration potentiometer. — (TE&M Lab Report)

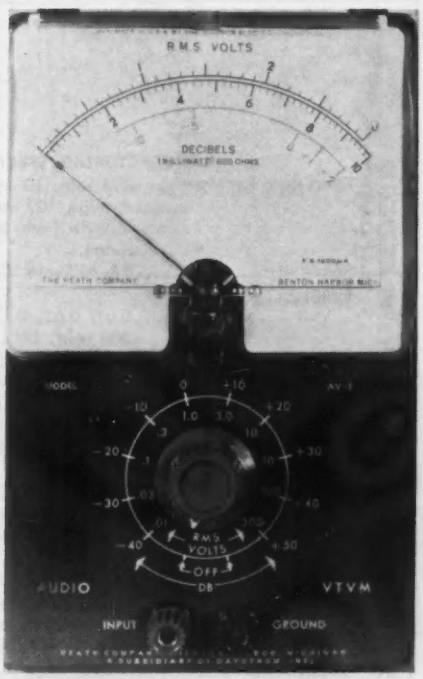


ILLUSTRATION D: — The 4½ inch meter movement features large scales. The bottom scale (decibels) is in red to aid in distinguishing between scales. — (TE&M Lab Report)

assembled in a few minutes past the seven-hour mark. Using this figure as a base for the computation of initial cost, it would appear that the average telephone company will have the following capital account on its books for this instrument:

Heath AV-3 Kit	$29.95
704 Spread Accounts (Insurance, handling costs, transportation)	9.00
Direct Labor — (7 hrs. at $2.25)	15.75
702 and 706 Spread Accounts (Supervision, engineering, vehicle overhead)	11.75
Total Book Investment	$66.45

This figure will, of course, vary from company to company in accordance with their percentages used for the various spread accounts, their labor costs, etc.

"Parts Placement In Minimum Space"

THE HEATH Company has become justly famous, among electronic technicians, for compact layout, thorough construction and operation manuals, and quality components. I found the same observations to apply in connection with this meter. The completed unit is shown in *Illustration A*, while *Illustrations B* and *C* show side views of the instrument, removed from its case. As can be seen, parts placement has been engineered to occupy the minimum of space and still give room for adequate maintenance.

The instrument was calibrated against an accurate AC voltmeter and only requires the adjustment of the "calibrate control" potentiometer for accurate alignment.

At the conclusion of the calibration of the instrument, it was given a TE&M Lab Check. The results of this Lab Test are shown in *Table One*, and indicate that the meter surpassed the specifications of the manufacturer in the range of the tests conducted.

Transmission Testing

BECAUSE of its high sensitivity and frequency response, this meter lends itself to a variety of applications in the telephone equipment room. With a db range of +52 to —52 db, transmission testing is an obvious application. The meter has an unbalanced input (one input terminal is grounded) and if used on trans-

TABLE ONE
LAB-CHECK of Heath Audio Vacuum Tube Voltmeter — Model AV-3

MANUFACTURER'S SPECIFICATIONS

Frequency Response: ±1 db. 10 cps to 400 kc, .01 volt through 100 volt ranges
±2 db from 10 cps to 40 kc, 300 volt range.
Sensitivity: 10 millivolts full scale (lowest range).
Range:
Volts: 0.01, 0.03, 0.1, 0.3, 1, 3, 10, 30, 100, 300 volts, RMS, full scale
Decibels: Total range —52 db to +52 db.
Scale —12 to +2 db. (1 mw-600 ohm).
Ten switch selected ranges from —40 to +50 db.
Input Impedance: 1 megohm at 1 kc.
Accuracy: Within 5% of full scale.
Multipliers: 1% precision type.
Meter: 4½" streamlined case with 200 microampere movement.
Tube Complement: Two 12AT7.
One 6C4
Power Supply: Power transformer, selenium rectifier with resistance-capacitance filter.
Power Requirement: 105-125 volts AC, 50-60 cycles, 10 watts.
Dimensions: 7 3/8" high x 4 11/16" wide x 4 1/8" deep.
Net Weight: 3 1/2 lbs.
Shipping Weight: 5 lbs.

LAB FINDINGS

Frequency Response:

The meter was tested for frequency response from 10 cps to 1 mc on the 1 volt and 10 volt ranges. Measurements were made using a 600 ohm load.

On the 1 volt range, no discernible deviation was found from 20 cps to 100 kc. The meter was up .25 db at 10 cps, down .5 db at 200 kc, and down 1 db at 400 kc.

On the 10 volt range, no discernible deviation was found from 20 cps to 350 kc. The meter was down .25 db at 10 cps, up .25 db at 400 kc, and up 1.3 db at 1 mc.

The results were graphed and are shown in Fig. 2.

No frequency response tests were run on the 300 volt range.

Scale Linearity:

A scale linearity test was performed on the meter, using the 1 volt scale. All tests were made at 1000 cps. The results are tabulated at right and were graphed as shown in Fig. 3. Readings to the third place past the decimal point required interpolation of the meter scale with attendant possibility of reading errors.

True Voltage	Indicated Voltage	Deviation	% Error
1.000	1.000	—	—
.903	.906	+.003	+ .3
.812	.815	+.003	+ .3
.706	.705	—.001	— .1
.605	.600	—.005	— .5
.506	.501	—.005	— .5
407	.400	—.007	— .7
.309	.299	—.010	—1.0
.205	.190	—.015	—1.5
.106	.092	—.014	—1.4

Tests made at 1000 cps on 1 volt scale
Max. + deviation .3 of 1% of full scale
Max. — deviation 1.5% of full scale

Scale Transfer Accuracy:

Scale transfer accuracy of the meter was checked by supplying a voltage to cause this meter to read near full scale and then shifting to the next higher scale to check readings. Results were as follows:

Scale	Set and Read		
.01 volts	.009		
.03 volts	.0086	.028	
.1 volts		.0265	.09
.3 volts	.28		.086
1.0 volts	.265	.9	
3.0 volts		.86	3.0
10.0 volts	9.0		2.85
30.0 volts	8.6	30.0	
100.0 volts		30.0	100.0
300.0 volts			101.0

Max. scale transfer deviation 1.15% of full scale

Sensitivity:

Lowest scale (.01 volt) is divided into intervals of .2 millivolt. Voltage increments of value to the fourth place past the decimal point can be read directly. Voltage increments to the fifth place past the decimal (.0000x) can be given significance by interpolation of the scale divisions.

Summary:

In the range of the tests conducted, the meter surpassed the specifications.

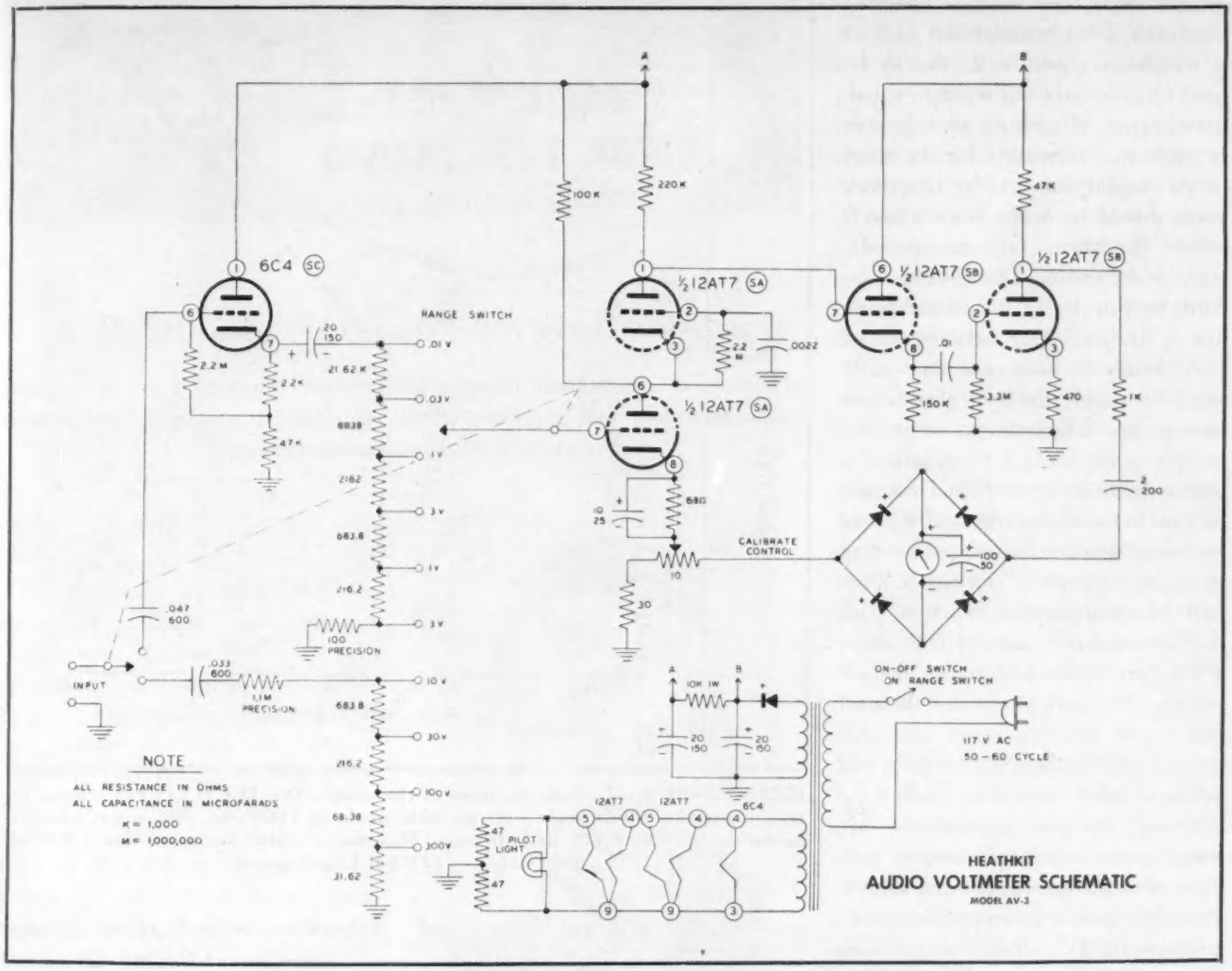


FIGURE ONE: — Schematic diagram of the meter. — (Heath Company.)

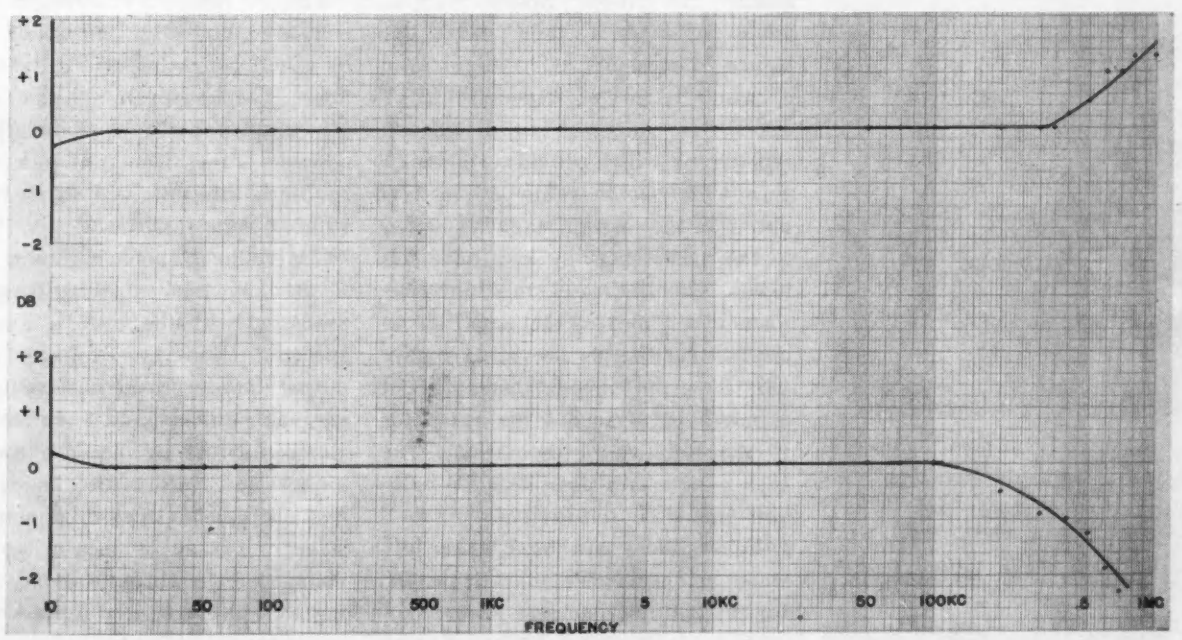


FIGURE TWO: — Frequency response of the meter. TE&M Lab Tests on the 1 volt and 10 volt range were conducted. The meter is essentially flat through the entire audio frequency range and the frequencies normally encountered in the telephone equipment room. — (TE&M Lab Rport)

mission tests, involving a balanced condition, a 1:1 transformer, such as a telephone repeat coil, should be used to transform the input to a balanced input. If such an arrangement is made, due correction for the effect of the repeat coil, at the frequency used, should be made. *Illustration D* shows the meter face as normally seen by the viewer. The bottom scale, calibrated in decibels, is in red as an aid in distinguishing between scales.

A handy adjunct can be easily made to supply the 600 ohm termination for measurements requiring such a load. Such a termination is shown in *Illustration E* and consists of two banana plugs spaced ¾″ on center, soldered to two output binding posts, also spaced ¾″ on center. One-half watt composition resistors, padded to measure a total of 600 ohms, ±1%, are connected across the assembly. The unit plugs into the normal input binding posts and still provides output binding posts for test prods or other connecting leads.

Other obvious applications are measurements of carrier output, voltages of small amplitude, and numerous other applications requiring measurement of AC voltages over a wide range of amplitudes and frequencies.

Let us not forget that test instruments in the telephone equipment room can pay for themselves over and over again. — C. D. Ehinger.

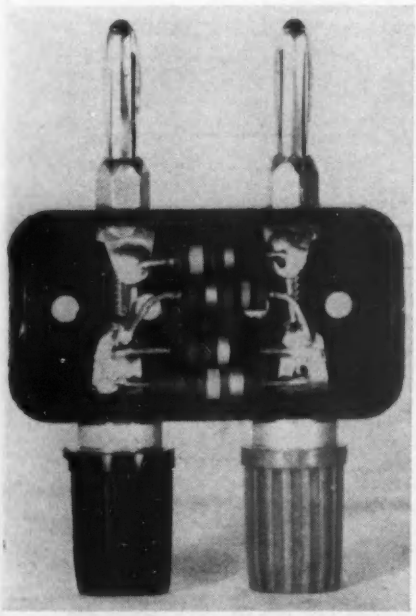


ILLUSTRATION E: — An easily made adjunct for this meter. One-half watt resistors are padded to 600 ohms, ±1% to provide a 600 ohm termination when needed. — (TE&M Lab Report)

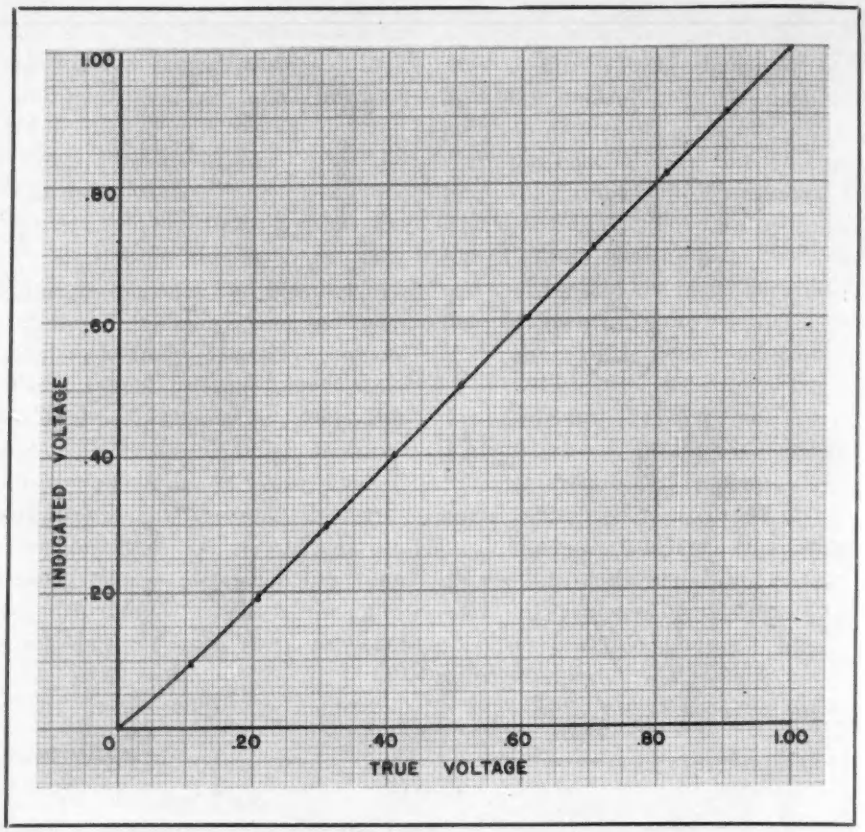


FIGURE THREE: — Scale linearity of the meter. The TE&M Lab ran a linearity test, using the 1 volt scale with all tests made at 1000 cps. Maximum positive deviation was .3 of 1% of full scale. Maximum minus deviation was 1.5% of full scale. — (TE&M Lab Report)

— 73 —

Manufacturer's Comments:

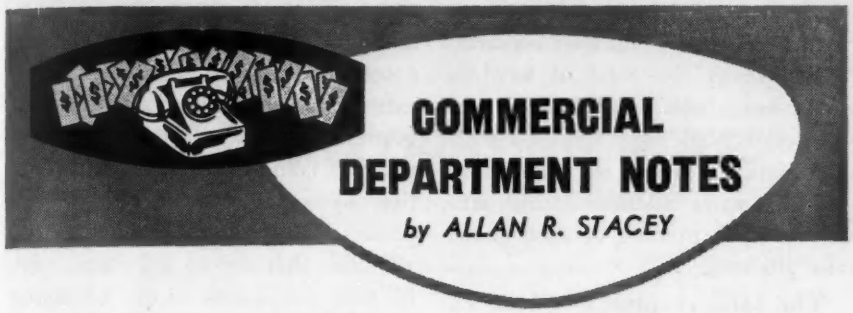
As pointed out by Mr. Ehinger's article the Heath Audio VTVM, model AV-3 is a stable meter designed to measure AC voltages over a wide range of frequencies. A 12AT7 is connected in a cascode type circuit which provides very high gain with relatively low noise. The output of the cascode stage is coupled to the meter stage by a cathode follower. This increases the high frequency response of the amplifier as a whole as well as providing higher gain from the cascode stage, since it is not being loaded. This also adds to the stability of the circuit. The high gain makes possible a 10 millivolt full scale sensitivity.

Four diodes are used in a full-wave bridge circuit to provide DC for the 200 microampere meter. Current returns to ground through a 10 Ω control and a 30 Ω resistor. The 10 Ω control also connects to the cathode of the input stage, thus applying negative feedback. Calibration is obtained by adjusting this 10 Ω control which varies the amount of feedback to the cathode and consequently the gain.

The .01 volt to 3 volt ranges inclusive, are coupled to the cascode stage by a 6C4 connected as a cathode follower. The 10 volt to 300 volt ranges are coupled by a capacitor to the cascode stage. Good frequency response is thus obtained on all ranges without compensation.

AC voltages at any point in practically any type of circuit can be measured with the VTVM. Filament voltage, power line voltage, noise, output and gain measurements can be made quickly and accurately by connecting the test leads across the point where information is desired. Voltage gain is measured stage by stage or overall by measuring input voltage versus output voltage, dividing the output by the input voltage.

Literature giving complete technical data may be obtained from Mr. C. M. Edwards, Dept. TEM, Heath Co., Benton Harbor, Mich.



A Profitable Number-Change Program

HERE's how one company tapped a live sales market and added sufficient new revenues to cover the cost of placing new number plates on each subscriber's telephone.

THE THOUGHTS in this issue might be entitled "How to Turn a Liability into an Asset." Recently one of our progressive operating companies was faced with the necessity of visiting each subscriber's premise in one exchange in order to place new number plates on telephone instruments in conjunction with a conversion of exchange prefix.

This company decided to take advantage of being on the subscriber's premise by selling additional equipment at the same time as changing the number plate. In so doing the company tapped a sales market that probably would not have been reached in any other way and added sufficient new revenues to cover the cost of the number change program. Let's see how they did it.

The author, ALLAN R. STACEY, is vice-president of the Sunland-Tujunga Tel. Co., Sunland, Calif.

Finding The Manpower

THE FIRST question to be answered is "Where do I get the manpower for this special program?" After looking at the present workload and personnel available within its own organization, this company decided to hire three young women at $2.12 per hour from a nationwide organization that specializes in providing all types of personnel for short or long periods of time. (I'll supply the name of the organization upon request.)

These young ladies were given about eight hours training relating to public relations, telephone company policies, sales pointers, rates and charges and suggested level of presentation.

Preparing The Subscriber

IN ORDER to have the householder more willing to invite the company representative into the home, an advance letter was sent to each subscriber. This letter stated that in conjunction with introduction of a new prefix a representative would call to change the phone number. The letter went on to state that the representative would be glad to answer questions about service and types of available equipment. Thus the customer was partially "conditioned" for a sale before he ever saw the company employe.

The Number Change

AFTER receiving proper training our lady representative went her way. At each subscriber's premise she introduced herself as a representative of the company and informed the subscriber of the primary purpose of the visit, which was to prepare the telephone for a number change. She answered questions prompted by the number change, replaced the old number plate with a new one, placed a temporary "stick-on" number plate with the old telephone number on top of celluloid over the new number plate.

She then instructed the subscriber as to the procedure. She explained that on the day that the number was to be changed the customer would be contacted and asked to remove the "stick-on" number plate as a part of the company's verification test. *Notice that in order to conduct the number change procedure she had to be inside the premises, which gave her a chance for scouting out need for additional services.*

The Sales Opportunity

WHILE inside the house our sales representative studied the floor plan, noticed the decoration scheme of the home and then made sales suggestions for improvement of the service. She explained to the customer certain telephone services and equipment that were available. Our saleslady made no attempt to sell such special services as PBX, Key System installations, Key-in-Base equipment, amplifier sets or other items which take special knowledge and special rates. Her instructions were to refer all of these items to the business office for subsequent follow-up.

However, in order that she might talk with knowledge about the ordinary items of service, she was given a two-page rate sheet from which to quote rates for such items as new business service, new residence service, long and retractile cords, colored telephone instruments, bells, gongs, jacks and charges for change of location of present equipment.

Now let's look at the results:

Cost of the number change program: — In all, 1,165 visits were made at a total cost of $493.96. This was based upon a total wage cost of $2.12 per hour and came out to a little over $.42 per visit. Incidentally,

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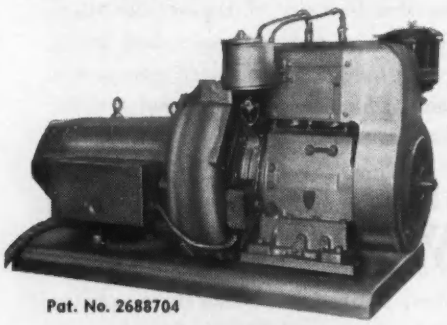

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this included 233 call backs and represented 932 basic customer contacts. Nearly all of this total of $493.96 would have been spent without the sales effort that was correlated with the program although we must recognize that some additional time was spent at each premise because of the sales attempts.

The sales results: — While on the customers' premises our three lady representatives sold the following items:

Extension Telephone	87
Colored Telephone	34
Miscellaneous-Jacks, Special Cords, Keys, etc.	26
Total Items	147

The gross revenue from these items was $444.00 for initial installation charges including one-time charges for colored telephones. The recurring monthly revenue from the extension telephones and miscellaneous items was $113.30 per month.

In summary then, a little more than four months of recurring rental charges would pay the entire cost of the number change program and for the remaining installation life of the equipment the company would receive revenues that very likely it would never have had without these personal visits to customer premises.

Assuming that the average location life for this equipment is somewhere between three and four years, the company picked up about three years' revenue ($4,078.80) while at the same time completing its number change program on what amounted to a no-cost basis for visiting subscriber premises.

Tie-In Recommended

THIS COMPANY recommends that, if possible, the door-to-door sales such as being discussed here should be made in conjunction with some other program which will gain entrance to the home. The number change program was one such example and others might be an inventory of station equipment or certain types of trouble routining at the subscribers' premises.

The advantages of being inside the home rather than on the doorstep are many. This company points out that the floor plan of the house can be noted and the specific advantages of extensions pointed out, and the decoration and color scheme of the home may be complemented by introduction of appropriately colored telephones.

Notice that out of 147 items sold, 87 were extensions — one of higher profit items. It appears to me that one of the "sure-fire" methods to sell extensions is correlating the attempt with some other event which gets your representative *inside* the home.

Next Issue

IN THE NEXT issue we shall be discussing the benefits available to small operating companies through telephone association-sponsored employe training sessions. In particular, we'll take a look at one state association's commercial department employe training program. — *Allan R. Stacey.*

Microwave Bulletins

GENERAL Electric Company has issued a new series of microwave bulletins, featuring channel facilities in G-E 2KMC systems. Compiled under No. ECM-72, the bulletins describe terminal stations, multiplex repeaters and junctions which serve as the "doors" through which information comes into and departs from the microwave carrier. An application table shows how services such as teletype, telemetry, supervisory control and telegraph are applied to the carrier.

For your copy write to *General Electric Company, Communications Products, Dept. TE&M, Lynchburg, Va.*

Drafting & Supply Catalog

ALFRED MOSSNER Company offers free to engineers, architects, draftsmen, commercial artists and designers a new 100-page 8½x11 Drafting Equipment and Supply Catalog.

One section of catalog illustrates and describes 120 time saving, clear plastic templates. For your copy write *Alfred Mossner Co.*, 108 *W. Lake St., Dept. TE&M, Chicago* 1, *Ill.*

ACCOUNTING NOTES

by G. M. JONES

Inventory Management Methods

INFORMAL stores management methods almost always have one undesirable characteristic: They lead to overinvestment in inventory. Here's how to reduce the amount of resources tied up in inventory, without impairing operations.

THERE IS in use a wide variety of methods for managing the size of parts and supplies inventories, ranging from such simple expedients as looking to see what's low, to refined mathematical formulae for deciding how often to reorder and in what quantity. Now there is nothing wrong with replacing stock on the basis of what we can see is low; it works very well in many cases. But informal stores management methods almost always have one undesirable characteristic: they lead to overinvestment in inventory. I propose to suggest here some approaches that may help to reduce the amount of resources tied up in inventories, without impairing operations.

The author, G. M. JONES, is assistant professor of Accounting & Financial Administration, Michigan State University.

The Effect of Investment in Inventory on Earnings

CARRYING parts and supplies is inevitable, just as a minimum cash balance and a minimum investment in receivables are inevitable. They are necessary to support our primary business of providing a service to customers. Unfortunately, these assets do not themselves produce revenue. It follows that a reduction in any of these three assets, if it does not interfere with operation of the business, will make more resources available for investment in other (revenue-producing) kinds of assets. The eventual result is to produce a higher net income from a given total investment.

One cannot expect a really dramatic improvement in net results where stores items constitute a proportionately small part of total investment; yet a shift of only $30,000 from a non-revenue-generating investment to a revenue-producing activity could make a difference of $2,000 or more in net after-tax income. If it can be assumed that inventory carrying costs amount to 20 per cent of average inventory, potential savings from eliminating $30,000 of overinvestment could be as much as $6,000.

On the other hand, for some inventory items, the amount in stock actually may be too small! For instance, if a year's usage of an item is $2, and the cost of handling an order to replenish stock is $2, it would be quite uneconomical to order at short intervals. We are generally inclined to ignore costs of ordering when establishing reorder levels, and this can be a serious mistake.

Let's look at some of the methods that are in use by various firms for deciding how much inventory to carry and when to reorder. We will work from the simple to the more refined techniques that have been developed.

Informal Reorder Decision Methods

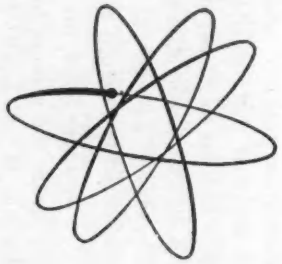
THE SIMPLEST basis for reordering is an empty bin. Because of its undesirable effects on service, it is seldom regarded as satisfactory. There must be some point before the bottom is reached, when a decision to reorder must be made. An experienced storekeeper can sense the reorder point on almost any item he handles. Unfortunately, we do not all have experienced storekeepers. Even more unfortunately, storekeepers tend to maintain a protective position, which means too much capital tied up in stores items.

A refinement of the empty-bin approach is the time-honored "two-bin" method. When one bin is empty, an order is placed. The quantity ordered will always be the same from time to time, but the frequency of ordering will vary with usage. There will be sufficient protective stock on hand in the second bin to cover demand during replacement lead time. The method avoids the possible out-of-stock situation that could arise from basing orders on a single near-empty bin.

The problem here is to make sure that the reserve bin contains enough stock to cover the replacement lead time plus a cushion for unusual demand that could arise during normal lead time or for delay in receipt. The tendency is to maintain an overstock in the reserve bin, "just to be sure." The basis for quantity ordered usually is likely to be what seems to be needed for a while, without any evaluation of the ordering costs involved, the carrying costs of the inventory item itself, or the costs of customer delays.

Carrying a little more refinement into the bin method, some firms have adopted "number of months' supply" as a basis for ordering. Some con-

TELEPHONE ENGINEER & MANAGEMENT'S Electronics



NOTE BOOK

By LEO G. SANDS

Prepared for
Educational Division
TELEPHONE ENGINEER & MANAGEMENT
7720 Sheridan, Chicago 26,
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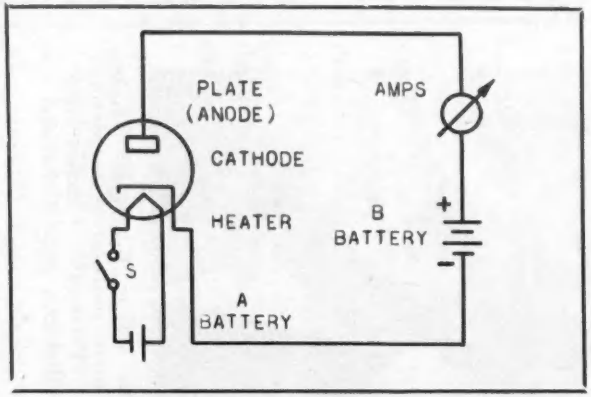
3-1.2 Indirectly Heated Cathode

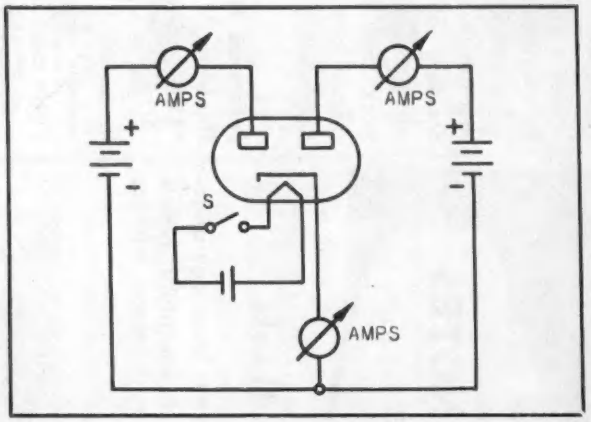
Most commercial diode tubes employ an indirectly heated cathode in lieu of a filament. The cathode emits electrons when its temperature is increased.



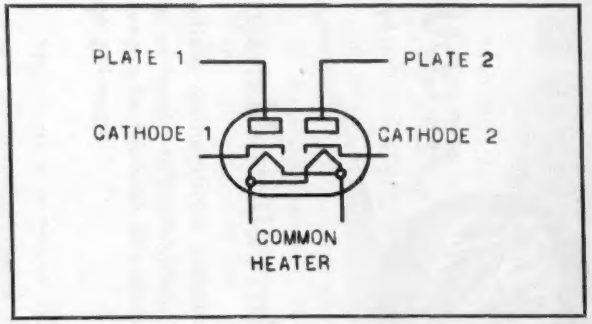
The heater and the cathode are electrically isolated from each other. When switch S is closed, there is a time delay before current starts to flow through the plate circuit because of the time required for the cathode to reach operating temperature.

3-1.3 Dual-Diodes

Many commercial diodes are packaged in pairs within the same glass bulb. Sometimes a common cathode is used. The cathode current is equal to the sum of the currents flowing through the two plates.



Some commercial dual-diodes have separate cathodes for each section so that the circuits of the two diodes may be completely independent.



More Data For Your "Electronics Notebook" on Page 54.

venient assumption is made as to what is reasonable as a size of order; so we find a uniform firm practice of ordering, say, 3 months' supply at a time, whenever bin condition indicates that it is time to order. The minimum stock quantity is also stated in terms of "months' supply." This has the advantage of requiring some study of what demand conditions are for items as a prerequisite to establishing the months'-supply criterion. The danger is in applying a 3-months' rule indiscriminately to all classes of items, regardless of unit cost and size of the item itself. Where stores items are classified by categories reflecting the necessary dollar investment and physical storage necessities, a 1-months' supply rule may be used for some items, 2-months' for others, and even 6-months' or a year for others.

None of the empty-bin systems imply the maintenance of perpetual stock records; none are needed. Another system which may be used without a perpetual inventory record is a periodic inspection system. After a "base stock" quantity is established for each item, a regular periodic count is made, and replacements are ordered in sufficient quantity to restore the balance to the predetermined base amount. The size of order varies under this method, but the frequency of ordering is constant.

This is a very systematic way of reordering, in that all items are reviewed at specific points in time; the weakness is that order sizes resulting may be quite uneconomical, both in terms of spreading the costs of handling an order over the units in the order, and in terms of transportation and discounts, if any, based on order size. Furthermore, the number of items on hand must be counted at each review in order to know the reorder quantities.

The months'-supply approach is subject to some modification for specific items with a demand that varies greatly from period to period. The more unstable the demand, the higher the minimum stock level must be set, in order to guard against out-of-stocks. On the other hand, for items of very variable demand but which are not

More Data For Your "Electronics Notebook" on Page 54.

REVENUE BOOSTERS

THE "Monitor," published by Mountain States Tel. & Tel. Co. reports *"These package sales of complete telephone service are becoming more and more common and sales by service representatives are gaining every month."*

A big factor in the increase lies in a new business office program called *"Four Steps To Sales."* Service representatives are learning to find out and to understand customers' needs, and then recommend tailored telephone service.

GETTING THE FACTS is step number one — getting a mental picture over the telephone of how many rooms are in the customer's home, the number of floors in the house and who uses the telephone service. Girls at Mountain States' Cheyenne office say they rarely get turned down on this step; customers like to talk about their homes and the girls enjoy the friendly chats.

RECOMMENDATIONS for complete telephone service make up step number two. The girls suggest a telephone on each floor of the home and at least one telephone for each of the three areas — living, working and sleeping. Personal reasons, such as step saving, receiving calls at night and privacy, always go along with every recommendation and are based on the customer's needs.

ANSWERING OBJECTIONS raised by the customer is step three, although every service representative tries to overcome objections before the customer brings them up. The Cheyenne girls agree their customers usually give one of three objections: One is the "hallway routine" as they call it, when the customer says he's always had "just one black telephone in the hall." Another is "I must ask my husband (or wife) first." Many say "I can't afford it" until they learn of low package rates and the advantages of adequate service.

CLOSING THE SALE is the final step. To get a definite answer, the girls close with a question, "Shall we go ahead with the installation?" they may ask. "We can't sell everyone," the girls say, but at least their efforts show customers we want to serve their needs and often sow seeds for future selling.

All Mountain States' service representatives have completed the Four Steps program. The three-day course employing discussion and film demonstrations now is initial training for all new representatives.

Success in using the Four Steps can best be measured in terms of soaring sales. In Cheyenne, where the business office held Four Steps training last fall and a refresher course in January, service representatives consistently break their own records. Their sales of color sets for the first quarter of 1958 were 425% over last year, and extension sales went up a startling 650%. They're selling around 160% of their high monthly sales objectives in both color and extensions.

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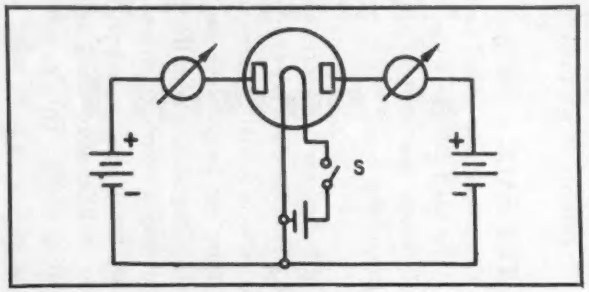
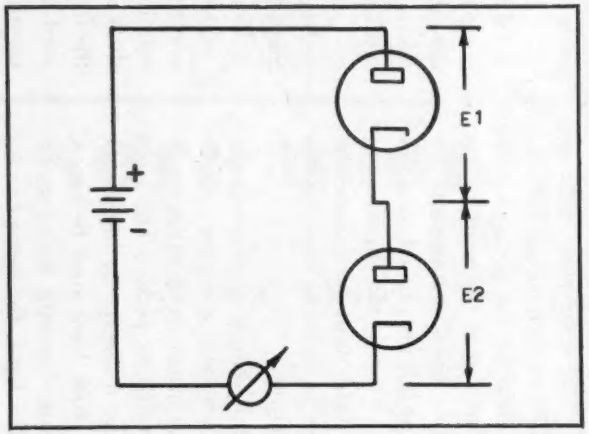
ELECTRONICS NOTEBOOK

By LEO G. SANDS

Many types of rectifier tubes employ filaments instead of indirectly heated cathodes. Among these tubes are the types 80, 5Y3GT and 5Z3.



3-1.4 Diodes in Series



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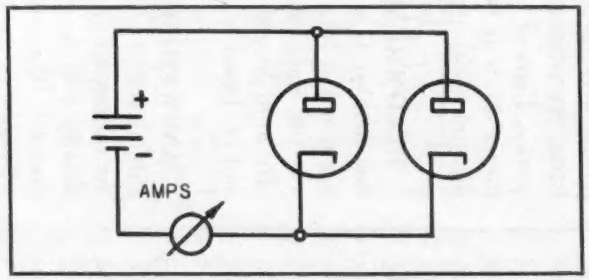
When two diodes are connected in series, the current flow through each will be identical. However, the voltage drop across each will only be equal if the diodes are alike, since the resistance between the plate and cathode varies among tubes. Note: In the symbols shown the heater has been omitted for the sake of simplicity. The heater is seldom shown in electronic circuit diagrams since it is understood that it exists.

3-1.5 Diodes in Parallel

When diodes are connected in parallel, the total current flow is the sum of the currents through each.



The voltage drop has to be the same, obviously, since they are in parallel. This type of circuit is used when greater current carrying capacity is required.

3-1.6 Diode as a Half-Wave Rectifier

When AC is applied across a diode and its load. current flows only in one direction. During the half-cycle that the plate is positive with respect to the cathode . . . current flows. During the other

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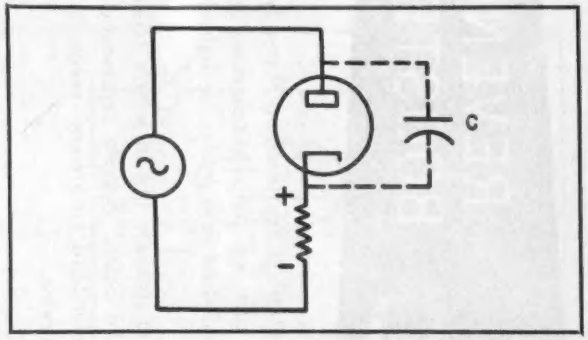
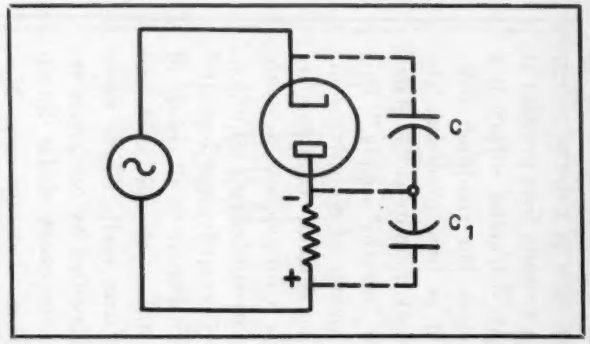


half of the cycle, the diode acts as an insulator, blocking current flow. The voltage developed across load R is pulsating DC polarized as shown. The output voltage does contain a tiny bit of the AC because of the inherent capacity (C) between plate and cathode. At power frequencies this is negligible but at RF, it may be significant.



More Data For Your "Electronics Notebook" on Page 56.

critical in terms of their effect on service, one can accept a minimum stock level which is somewhat above the most probable demand, but still considerably below the level needed to be able to fill *all* orders *all* the time. In other words, we are willing to be out-of-stock part of the time if we can thereby carry smaller inventories for noncritical items.

The number-of-months'-supply method has the virtue of consistency; the decision to reorder is based on the same criterion from one time to the next and from case to case, and once established, its use does not depend on a high level of storekeeping experience. — *Continued in the next issue.*

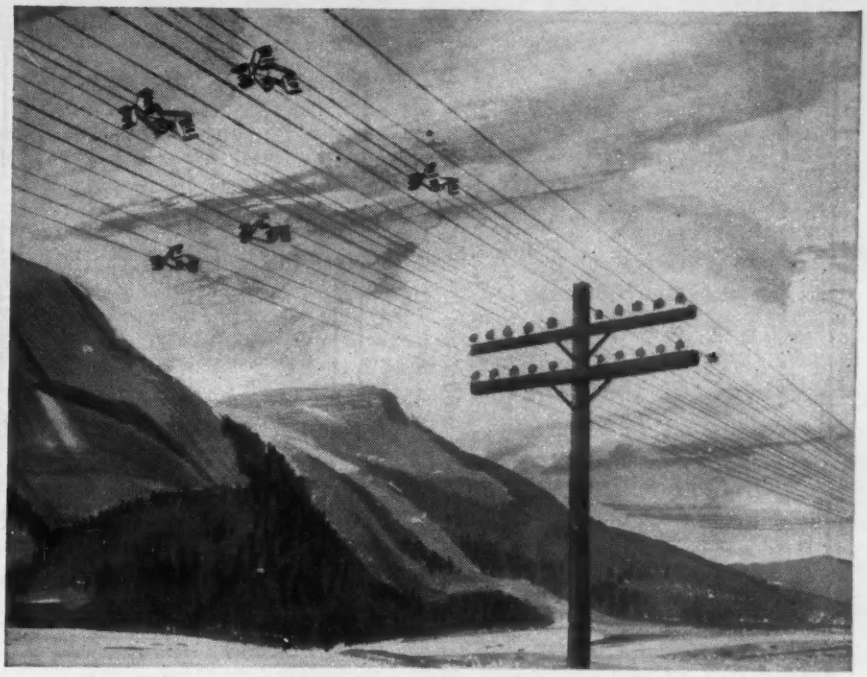
Book Review

"Applied Statistics For Engineers, *By Wm. Volk;* 354 *pages,* 6 *x* 9; $12.50. Order from *Educational Division, "Telephone Engineer & Management,"* 7720 *N. Sheridan Rd., Chicago* 26, *Ill.*

Designed especially for engineers in the chemical and processing fields, this book provides necessary background and examples of statistical problems enabling the application of statistical analysis to engineering data. The book emphasizes engineering applications rather than theory and provides a number of illustrative examples. The illustrations deal with the treatment of engineering data for correlation, precision, and analysis of experimental factors.

Besides offering the reader a view of the whole field of statistics and engineering, the book is arranged so that each chapter is complete in itself. Thus, a reader with a particular problem can see how that type of problem has been handled, without necessarily reading the entire book. The book not only describes the method of drawing the "best" line through the data, but also the method of determining how well the line fits the data and how much variation in the data is eliminated by the line and by the correlation and how much variation still remains.

There are also detailed discussions of curvilinear correlation, the analysis of the variance, and the interpretation of the analysis of variance.



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The Case span-point transposition bracket now makes it possible to transpose communication wires at any point of the line **between poles,** regardless of pole spacing ...eliminates the need for special transposition poles. This lightweight (only 3½ lbs. complete with insulators and bushings) non-corrosive, ruggedly designed bracket features insulators that roll thus protecting wire insulation in stringing and reducing installation time. It is the **only** bracket designed **especially** for mid-span transpositions.

All Case transposition brackets come equipped with a special rubber bushing... in the event of glass insulator breakage, the line wire falls on the rubber bushing, with no loss of communication service.

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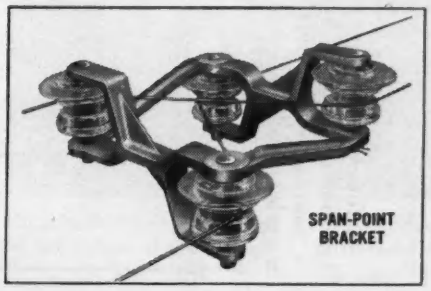
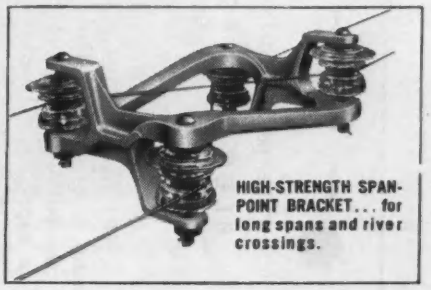


SPAN-POINT BRACKET



HIGH-STRENGTH SPAN-POINT BRACKET... for long spans and river crossings.

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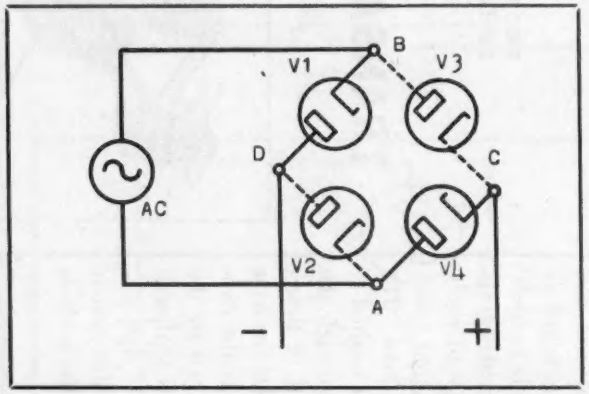
ELECTRONICS NOTEBOOK

By LEO G. SANDS

DC output of opposite polarity may be obtained by reversing the diode as shown. In either case, the pulsating DC may be smoothed out by adding a capacitor, C1, across the output. This capacitor also eliminates the AC leakage through the diode by by-passing it to ground.

3-1.7 Diodes as Full-Wave Rectifiers

A full-wave rectifier may be formed by connecting four diodes in a bridge circuit. When point A is positive with respect to point B (during half of a cycle), diodes V1 and V4 conduct. Thus point C



is positive with respect to point D. During the other half of the cycle B is positive with respect to A. Diodes V1 and V4 do not conduct, but diodes V2 and V3 do. Again point C is positive with respect to D. Since these two points reach positive peaks

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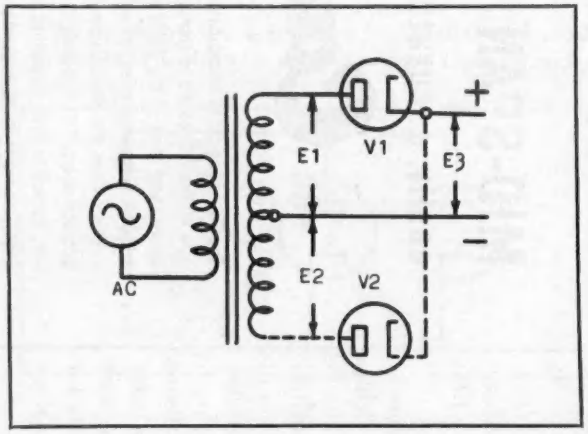
during each half of the cycle, rectification takes place during both halves of the cycle. The DC output voltage pulsates at twice the input voltage frequency. (At 60 cps, the ripple is 120 cps).

Only two diodes are required to obtain full-wave rectification when a center-tapped transformer is used. Voltages E1 and E2 are equal. During one half of the cycle, the plate of V1 is positive, but



the plate of V2 is negative. Hence, V1 conducts and V2 blocks current flow. Voltage E3 is approximately the same as E1. When the cycle reverses, the plate of V2 is positive and the plate of V1 is negative. V2 now conducts and V1 opposes current flow. Yet, E3 exists because voltage is now applied through V2. E3 is a pulsating DC voltage with

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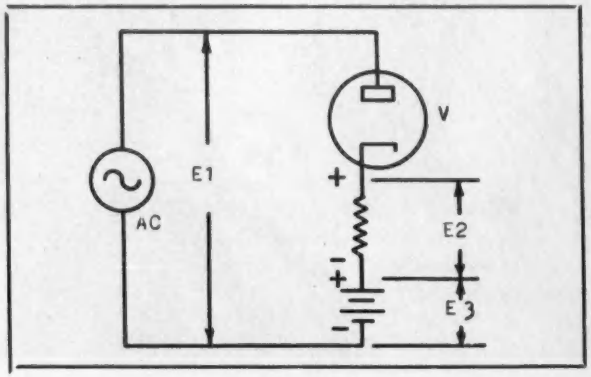
By LEO G. SANDS

ripple at twice the AC input frequency since two positive peaks are reached during each cycle.

3-1.8 Biased Diodes

In some electronic circuits it is desirable that a diode does not conduct until a certain voltage has been reached. This is done by biasing the diode so



as to oppose the applied voltage. If the battery shown is 6 volts, E1 will have to reach a level of more than 6 volts to cause current flow, and hence develop a voltage across load R. During each positive half-cycle of the applied AC, current flow does not commence until the input voltage has passed the 6-volt level. E3 can be set to any desired value of bias. E2 will be reduced by that amount, and the shape of the waveform across R (pulsating DC) will have changed.

More Data For Your "Electronics Notebook" In The Next Issue.

PLANT NOTES ON NEW DEVELOPMENTS

by JOHN S. REED

"New Cathode Metal Sputtering Technique"

Technique of cathode metal sputtering may be practical for producing precision printed circuits used in modern communications equipment . . . New standard color code established for thermoplastic jacketed and insulated telephone cables.

Metal Sputtering of Possible Value for Printed Circuits

RECENT research by the Bell Telephone Laboratories indicates that the technique of cathode metal sputtering may be practical for producing precision printed circuits used in modern communication equipment. It may be possible to make entire circuits, including resistors, capacitors, and leads, by the method in which ionized gas molecules bombard a cathode, dislodging atoms of metal which then redeposit on nearby surfaces.

This technique has produced thin films of a number of high melting point, strongly adhering metals of interesting electrical properties. Thus tantalum and titanium, which melt at 3000° C and 1670° C respectively, can be laid down in films of sufficiently high resistivity to be useful as resistors in printed circuits. With proper masking of the substrate or foundation, lines and patterns of practically any desired shape and size down to a few mils in width can be formed. These sputtered films generally are between a few hundred and a few thousand angstroms thick. In addition to pure metals, alloys such as those of nickel-copper and nickel-chromium can be sputtered without difficulty, apparently retaining their approximate original composition.

Printed capacitors have been made by a combination of sputtering and chemical methods. A tantalum film of the proper shape and size is first sputtered onto the substrate and then oxidized to form a film of tantalum oxide dielectric. The counter electrode, a film of gold, can then be evaporated onto the dielectric to form the completed capacitor "sandwich."

Copper leads can be easily sputtered to connect the various components. The technique is attractive since it eliminates the need for using organic adhesives.

The exact mechanism of cathode sputtering is not fully known. However, its effects, which were first noted in 1852 by W. R. Grove, and in 1858 by J. Plucker, can be easily described and recognized. In cathode sputtering, a plate of the metal to be deposited is used as a cathode. The substrate on which the film is to be deposited is placed on a table close to the cathode. After evacuation, argon or other suitable gas is introduced and maintained at a pressure of approximately 20 to 40 microns (.02 to .04 millimeter). A voltage is then applied to ionize the atoms of the gas, causing bombarding of the cathode and dislodging metal atoms or clusters of atoms, which deposit on the substrate. The thickness of films so produced can be controlled within narrow limits.

In "reactive sputtering," films of inorganic compounds are formed by introducing a small controlled amount of a reactive gas such as oxygen, nitrogen, or hydrogen sulfide into the apparatus. Compounds which can be formed in this way include the oxides, nitrides, and sulfides of a number of metals.

Color Coded Telephone Cable

NEW STANDARD color code for thermoplastic jacketed and insulated telephone cables is being established, with simple coding possible by

HAROLD BASSECHES of Bell Telephone Laboratories (center) describes some of the properties of a newly sputtered film resistor to R. W. BERRY (right) and P. L. McGEOUGH. Sputtering apparatus used in preparing these films is shown in the background.

Type 88-T Speak

the most compact loud-speaking p

For home and office

Now you can offer subscribers—in the home and office—the most compact loud-speaking phone ever made. It's Automatic's no-hands Speakerphone—more compact because it is *transistorized.* There is no separate control cabinet. No special power supply is required. You install the Speakerphone exactly like a Type 80 telephone. In fact, Speakerphone is the *same size and shape* as the Type 80.

Housewives and businessmen appreciate the simple operation of Speakerphone. There's a single "On-Off" button, a knob for volume control and a small signal light. The microphone is built in, and there is a small, separate speaker. Speakerphone has all the regular Type 80 features and comes in 10 decorator colors.

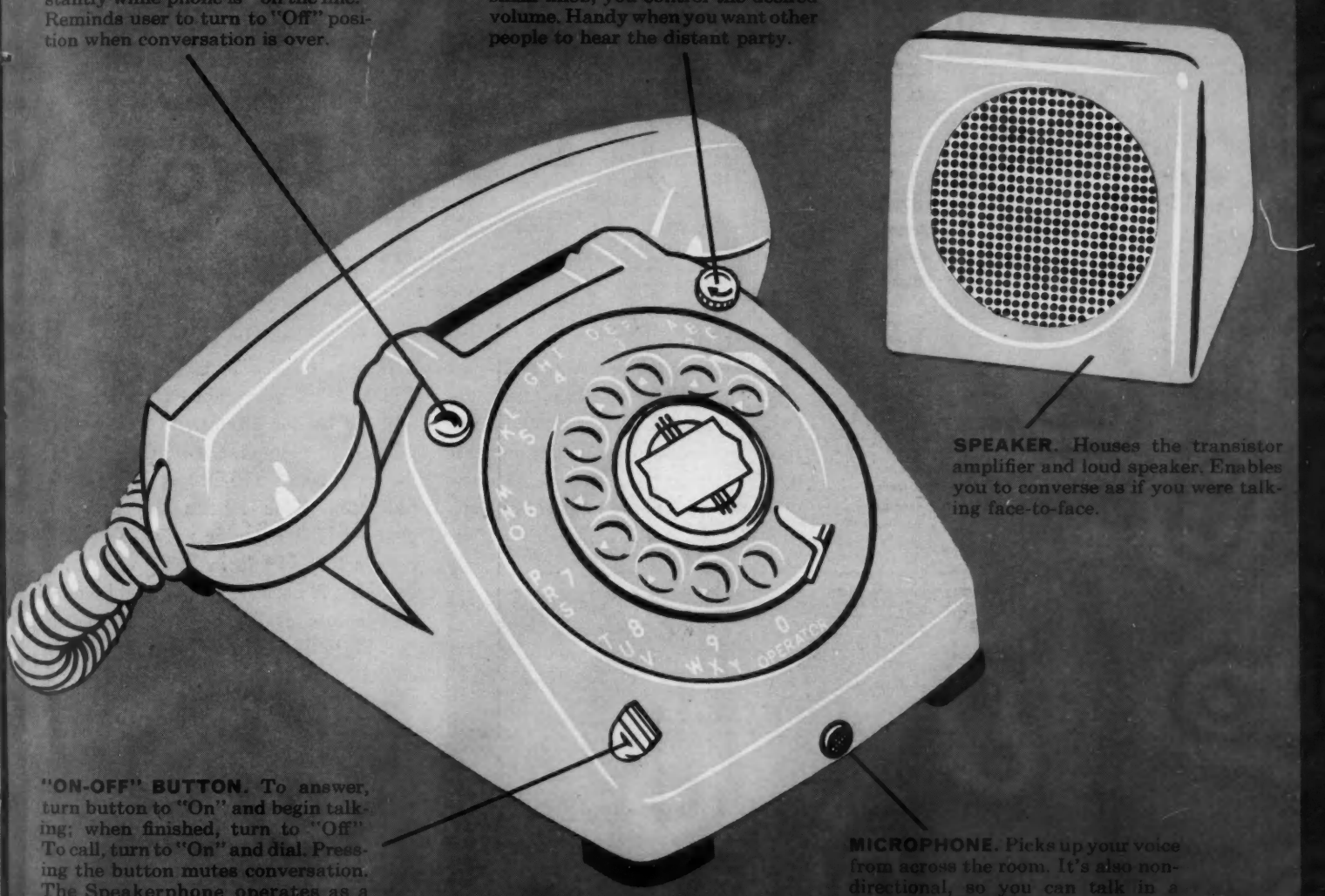
For complete information on Automatic's transistorized Speakerphone, write for Circular 1857-C (includes a description of AE's new Speakerphone Conversion Set, which enables you to convert regular phones to loud-speaking service). Address: *Automatic Electric Sales Corporation, Northlake, Illinois. Or call Fillmore 5-7111.* In Canada, Automatic Electric Sales (Canada) Ltd., 185 Bartley Drive, Toronto 16.

akerphone

g phone available

SIGNAL LIGHT. Flashes constantly while phone is "on the line." Reminds user to turn to "Off" position when conversation is over.

VOLUME CONTROL. With this small knob, you control the desired volume. Handy when you want other people to hear the distant party.



SPEAKER. Houses the transistor amplifier and loud speaker. Enables you to converse as if you were talking face-to-face.

"ON-OFF" BUTTON. To answer, turn button to "On" and begin talking; when finished, turn to "Off" To call, turn to "On" and dial. Pressing the button mutes conversation. The Speakerphone operates as a regular phone, too—just lift handset and turn button to "Off."

MICROPHONE. Picks up your voice from across the room. It's also non-directional, so you can talk in a normal voice from any direction.

AUTOMATIC ELECTRIC

Subsidiary of

GENERAL TELEPHONE & ELECTRONICS

GENERAL SYSTEM

elimination of extra pairs in the plastic insulated cables. This, in turn, enables simplification of cable records.

Color-coded cables are being supplied in multiples of 25 pairs with all pairs guaranteed, using ten colors listed below to individually color code the conductors of each 25-pair group, up through 600 pairs.

Tip Conductors	Ring Conductors
White	Blue
Red	Orange
Black	Green
Yellow	Brown
Violet	Slate

The color combination of the conductors of each pair in a 25-pair group is shown in the table below:

PAIR COLORS OF A 25-PAIR GROUP

Pair No.	Tip Conductor	Ring Conductor
1	White	Blue
2	White	Orange
3	White	Green
4	White	Brown
5	White	Slate
6	Red	Blue
7	Red	Orange
8	Red	Green
9	Red	Brown
10	Red	Slate
11	Black	Blue
12	Black	Orange
13	Black	Green
14	Black	Brown
15	Black	Slate
16	Yellow	Blue
17	Yellow	Orange
18	Yellow	Green
19	Yellow	Brown
20	Yellow	Slate
21	Violet	Blue
22	Violet	Orange
23	Violet	Green
24	Violet	Brown
25	violet	Slate

The 25-pairs are in turn color coded with the same colors as used for the tip and ring conductor combinations, beginning with white-blue and going down the list, white-orange, white-green, etc., as indicated in the table on color code of binder groups:

Each color combination for a pair is assigned a pair count number within the 25-pair group. The group color coding likewise designates the group number. The pair and group colors then indicate the pair number within the cable.

COLOR CODE OF BINDER GROUPS

Group No.	Color of Binding Ribbon	Group Pair Count Corresponding to Ribbon Color
1	White-Blue	1-25
2	White-Orange	26-50
3	White-Green	51-75
4	White-Brown	76-100
5	White-Slate	101-125
6	Red-Blue	126-150
7	Red-Orange	151-175
8	Red-Green	176-200
9	Red-Brown	201-225
10	Red-Slate	226-250
11	Black-Blue	251-275
12	Black-Orange	276-300
13	Black-Green	301-325
14	Black-Brown	326-350
15	Black-Slate	351-375
16	Yellow-Blue	376-400
17	Yellow-Orange	401-425
18	Yellow-Green	426-450
19	Yellow-Brown	451-475
20	Yellow-Slate	476-500
21	Violet-Blue	501-525
22	Violet-Orange	526-550
23	Violet-Green	551-575
24	Violet-Brown	576-600
25	Violet-Slate	601-625

A 50-pair cable has two 25-pair groups; a 100-pair cable, four 25-pair groups, and so on. Since 25 different color-pair combinations are available, 25 color groups are also obtainable making a total of 625 pairs that can be identified by this system.

If it is desired to locate pair No. 198 in a 300 pair cable, refer to the table of binder groups. In the group pair count column, the binder group for pair count 176-200 is No. 8 or red-green. This locates the binder group which contains pair No. 198. Subtracting 176 from 198 gives pair No. 22. According to the table on pair colors of 25-pair groups, pair No. 22 is the violet-orange pair.

This color code scheme positively identifies every pair in and up to a 600 pair cable without the need for testing out the pairs. The binder color locates the group and the color code of the pair in the group identifies the desired pair.

In manufacturing the cables, it is sometimes necessary to split the 25 pair groups into sub-groups, or units, so as to make cables round and smooth. The units making up a group have the same color-coded binder. On opening the cable for splicing, the units are combined into 25-pair groups by wrapping them with colored binding ribbons or a length of a color-coded wire pair, thus restoring the basic 25-pair color groups

Chickamauga (Ga.) Telephone Co. recently started service and placed into operation it's High Point, Ga. exchange. Photo shows Chairman MATT L. McWHORTER (left) of the Georgia Public Service Commission talking with H. W. VAUGHAN, president of Chickamauga Tel. Co. regarding the new exchange.

TELEPHONE ENGINEER & MANAGEMENT'S

PLANT MAN'S

"SPEC" BOOK

Prepared By
Educational Division
TELEPHONE ENGINEER & MANAGEMENT
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(6) Tree and Brush Control – Chemical Spraying

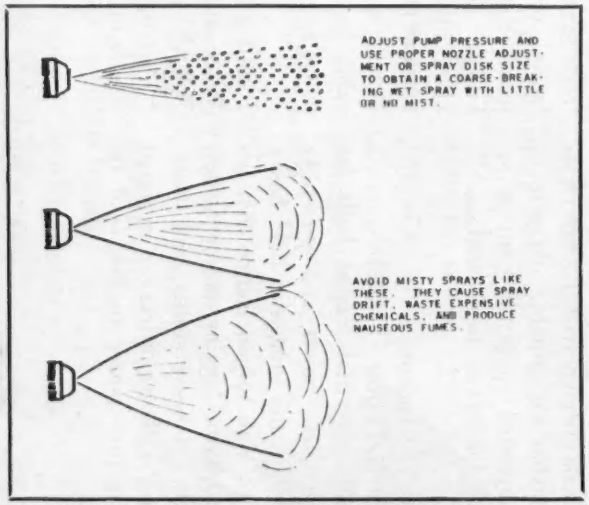

ADJUST PUMP PRESSURE AND USE PROPER NOZZLE ADJUSTMENT OR SPRAY DISK SIZE TO OBTAIN A COARSE-BREAKING WET SPRAY WITH LITTLE OR NO MIST.
AVOID MISTY SPRAYS LIKE THESE. THEY CAUSE SPRAY DRIFT, WASTE EXPENSIVE CHEMICALS, AND PRODUCE NAUSEOUS FUMES.

FIG. TWO: — Illustrating adjustments of pump pressure and spray nozzle to obtain desired spray.

Cut-stump spraying produces excellent results for large trees, which are cut down with power saws while still green and the stumps sprayed. This method is practically the same as the basal spraying procedure in that the entire basal portion of the stump is doused with the spray down to the ground line. It is important, too, to spray exposed roots around the stump since these may also sprout.

Accomplishing the initial basal spraying in the dormant season affords an opportunity for the second trip to be made quite expeditiously and economically

(7) Tree and Brush Control – Chemical Spraying

OBTAIN COMPLETE COVERAGE ALL AROUND STEMS IF NECESSARY PUSH BACK GRASS AND WEEDS WITH HAND BOOM SO LIQUID WILL REACH BARK DOWN TO GROUND LINE.
IN EXTENSIVE SPRAYING WORK LIGHT UNIONALLS ARE RECOMMENDED TO PROTECT CLOTHING. ALSO NEOPRENE OVER-SHOES TO PROTECT LEATHER SHOES FROM DAMAGE.
SPRAY NOT MORE THAN 12" TO 14" OF STEMS FROM GROUND LINE UP.

FIGURE THREE: — Method of basal spraying small trees and brush.

during the growing season, as it is easier to distinguish the living plants from the dead ones and thus avoid unnecessary spraying. If a careful job has been done on the initial trip, the second trip can be done quite rapidly.

One peculiarity of basal bark spraying in the dormant season is that many of the plants sprayed during the winter time will start growing in the spring and some will appear to make vigorous growth only to gradually wilt and then die.

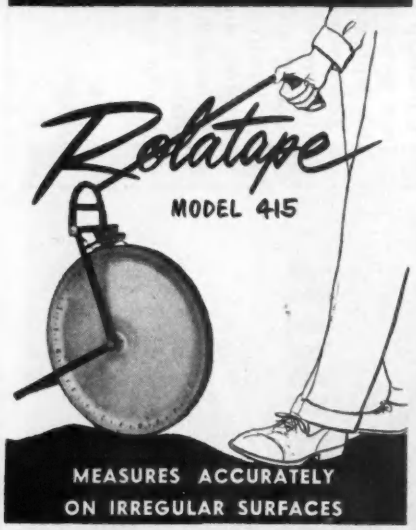
Since the herbicide used in the spraying operations covered in the instruction is non-selective in its effect on woody plants, it will kill ornamental shrubbery, fruit trees, garden flowers and certain crops. Alfalfa, beans, melons, and tomatoes are examples of crop plants that are very sensitive to spray drift. For this

More Data For Your "SPEC BOOK" on Page 65.

It's New!

NOW–AT LAST A MEASURING WHEEL THAT MEASURES ACCURATELY TO A FRACTION OF AN INCH!

Rolatape's amazing new Model 415 meets all your measuring needs — measuring quickly and surely over the most uneven and irregular terrain with no risk of human error. This time-saving instrument is calibrated to measure accurately in full view of operator as it is rolled along, giving measurements in inches (to ½ inch) on one side of measuring wheel, and tenths of a foot (to .5 of a foot) on the other. Sturdy and lightwight, it is equipped with automatic brake and built-in stand. Handle folds compactly. See one at your dealer's today.



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which were separated at the factory.

Besides simplification of cable records, other advantages are claimed for the new color coding system. The testing out of cable pairs is made unnecessary since, in most cases, color-to-color splicing can be used in placing new cable. Cable terminals can be connected to selected pairs by following the color code, a particular advantage when ready-access type terminals are being installed.

Rearrangements and additions to the pair count can be easily accomplished with the new system. If this involves a change of code, the plant people can be instructed on the changes in the code for the pair count. Cable pairs may be more efficiently used and a more flexible plant obtained, especially when ready access terminals are employed. These terminals enable any number of pairs to be connected up to the limit as required for service to subscribers.

Utility Tractor With Backhoe

NEW industrial tractor built for stamina, power and versatility needed in the industrial field has a 40 hp. high torque engine that develops extra lugging power at low speeds. Maneuverability and faster cycling in close quarters are increased by full-time power steering and individual turn brakes that can be interlocked for simultaneous use.

Choice of power for job requirements is provided by the dual-range transmission with six speeds forward and two reverse. In-line shifting and fluid, positive clutching are featured. A foot throttle that over-rides the hand throttle speeds the cycle time. Available as optional equipment is the hydraulic system quandrant control for rear-end attachments. The heavy-duty cast steel front axle was built especially to withstand the stress of heavy industrial use.

The tractor with loader and backhoe for trenching work is basic for a number of attachments including a crane, fork lift, angle dozer, scarifier, and many other buckets for specialized jobs. With the backhoe, the tractor digs flush alongside buildings, fences, or other obstructions. The trencher attachment on the tractor is said to be capable of digging in more adverse conditions than other types of trenchers. Other attachments include a tipping trailer, a pipe and cable layer, a multi-purpose blade, and a soil scoop.

Placing Buried Wire and Cable

MANY SMALL telephone exchanges, formerly with wire strung on trees and fence posts, are

Shown in action here is the new Work Bull 202 tractor with Davis front-end loader and Davis backhoe which has been designed and engineered to meet the heavy demands and rough duty of a utility tractor for industrial users. This tractor is also used with the Auburn Trencher for trenching operations.

50 years from now!

We hope and trust the then publishers of TELEPHONE ENGINEER & MANAGEMENT will be as happily proud and as busily engaged in observing the 100th Anniversary of the publication as our staff is in commemorating it's 50th birthday in this year of nineteen hundred and fifty-nine.

We hope they will turn back the records to the bound volume of our 1959 issues, in which year we modernized our editorial policies, brought new and specialized writers into the magazine columns; pinpointed our reader coverage and then watched our paid circulation and advertising volume forge steadily upwards to new levels.

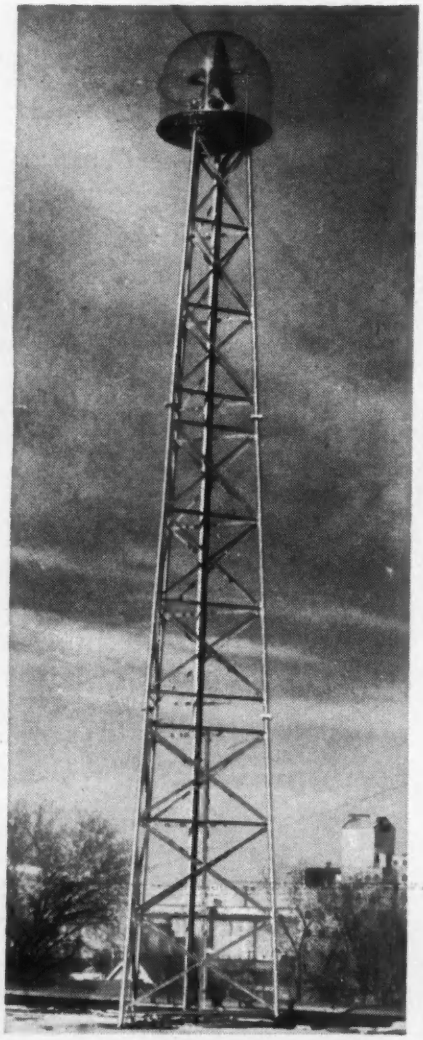
We hope they will especially take note of our 50th Anniversary Issue, dated July 15, 1959, and compare the "prognostications-of-things-to-come" written by the leaders of the telephone world at that time with the developments that will have transpired during the interim fifty years. Remember 50 years ago? Who would have thought of Radio, TV, Talking Pictures, Transistors, Microwave, etc.?

50th Anniversary Issue

The coming July 15th issue of TELEPHONE ENGINEER & MANAGEMENT will be our 50th Anniversary number. In addition to the regular editorial staff, outstanding men of the telephone industry are preparing special articles devoted to "what's new" . . . "things-to-come" . . . and what "the future holds" for the fast growing communications industry.

Manufacturers are being invited to join in the theme of this issue. Several of them will be displaying new equipment and new ideas destined to become a vital part of improved telephone operations of tomorrow.

ROHN
SELF SUPPORTING
COMMUNICATION TOWER



(This radar weather tower of KSTP-TV, Minneapolis, uses the 3 lower sections of the ROHN "Self-Supporting" tower. Note construction, design and size.)

HERE ARE THE HIGHLIGHTS OF THE ROHN "SS" TOWER:

- ★ **130 ft. in height, fully self-supporting!**
- ★ **Rated a true HEAVY-DUTY steel tower, suitable for communication purposes, such as radio, telephone, broadcasting, etc.**
- ★ **Complete hot-dipped galvanizing after fabrication.**
- ★ **Low in cost—does your job with BIG savings—yet has excellent construction and unexcelled design! Easily shipped and quickly installed.**

FREE *details gladly sent on request. Representatives coast-to-coast.*

ROHN *Manufacturing Co.*
116 Limestone, Bellevue, Peoria, Illinois

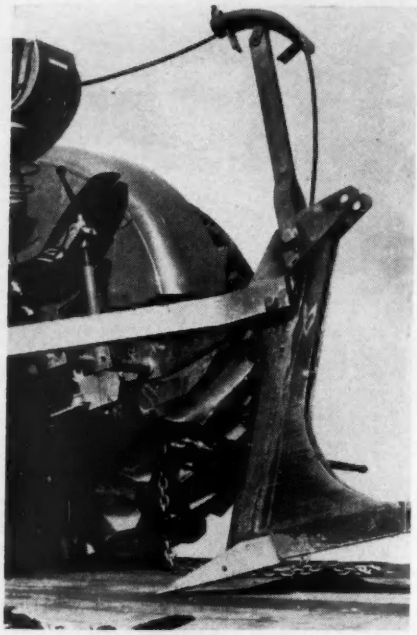
"Pioneer Manufacturers of Towers of All Kinds"

now being rehabilitated and existing lines extended by telephone companies with wire laid underground by means of farm tractors and equipment adapted to install the wire and cable.

With the use of farm wheel tractors and special equipment for plowing the cable into the ground, underground wire and cable are being installed safely and economically. Subsoilers ordinarily used to break hardpan and loosen soil in farming are modified as shown at right to lay the wires and cable from 18 to 24 inches below the surface. Front-end loaders, normally intended for handling manure and other materials on the farm, are modified to carry a reel from which cable feeds through the subsoiler in the ground.

Illinois Bell Telephone Co., for instance, owns three International W-400 and 450 tractors specially equipped with McCormick loaders and subsoilers for plowing cable underground. Additional tractors are rented as needed by the telephone company from dealers and farmers to operate other McCormick subsoilers modified into wire and cable laying plows.

Laying cable generally is a two-man operation, and tractors are driven so that the wires will be placed at least two feet off the traveled portion of the road, out of ditches, or



Shown here is the McCormick subsoiler modified to place telephone and other cable 18 to 24 inches under the ground surface. Wire feeds through the guide at the top and between the sides welded to the subsoiler standard and into the ground at the bottom. (International Harvester Co.)

along the fence line in an effort to minimize the possibility of accidental cable damage. Where roadways are narrow and this cannot be done, the subsoiler penetrates hard gravel roads, burying the cable down the center of the road.

Lines may be buried all the way to a subscriber, or they may be run on poles from the underground cable to

In a cable laying operation near Quincy, Illinois, telephone cable from the reel carried on the hydraulic loader, mounted on the front end of an International W 450 tractor, feeds through the modified McCormick subsoiler into the ground. Two men and this type of equipment often cover more than a mile an hour. (International Harvester Co.)

TELEPHONE ENGINEER & MANAGEMENT'S

PLANT MAN'S "SPEC" BOOK

(8) Tree and Brush Control — Chemical Spraying

reason, care must be taken not to let the drift from the spraying operation come in contact with such plants growing on private property abutting the right-of-way being sprayed. Dormant season spraying avoids this problem.

Use of Hand Sprayers

Following the second application by power spraying, there will be little regrowth for a long period of time. During this period, there will be occasional growths which, if left alone, would gradually spread until extensive spraying would again be required.

Sprouts along the rights-of-way can be destroyed by providing combinationmen with three-gallon hand sprayers filled with the same herbicide used in power spraying. These men keep on the lookout for unwanted sprouts and spray those found on the rights-of-way they traverse on their rural assignments.

To prevent the formation of sludge in the hand sprayer and to keep it in good working condition, it should be properly maintained. The sprayer should be removed from the truck during the winter season, washed and cleaned with a detergent (washing powder). It should be examined for needed repairs or replacement of parts such as washers and hoses. Any needed repairs should be made on the spot. If no repairs are needed, the sprayer may be kept in a storeroom until it can be used again in early spring.

During the spraying season, the sprayer should be cleaned and washed out with water or a detergent powder periodically as needed. At this time, the sprayer should be examined for any required repairs and these repairs made as needed.

TELEPHONE ENGINEER & MANAGEMENT'S

PLANT MAN'S "SPEC" BOOK

(9) Tree and Brush Control — Chemical Spraying

FIG. FOUR: — Three-gallon hand sprayer in rack on combinationman's truck. Note sprayer boom and nozzle resting in holder.

The sprayer is best carried in a rack provided for it on the truck, in a location readily accessible to the combinationman as shown in Figure 4. Details of a suitable rack design are illustrated in Figure 5. It is important that the sprayer not be transported

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(10) Tree and Brush Control — Chemical Spraying

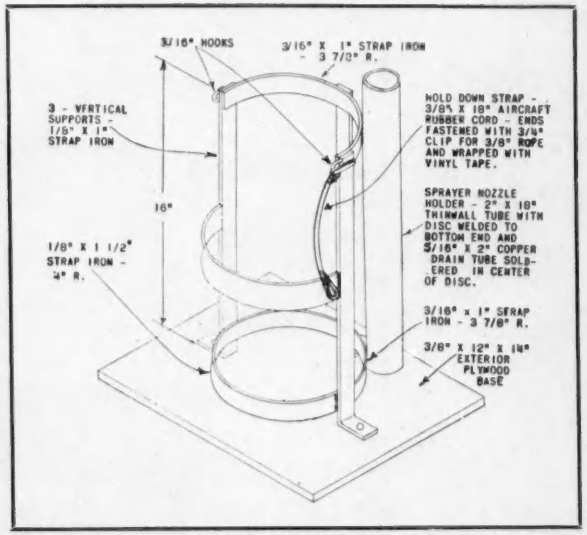

3/16" HOOKS
3/16" X 1" STRAP IRON - 3 7/8" R.
3 - VERTICAL SUPPORTS - 1/8" X 1" STRAP IRON
HOLD DOWN STRAP - 3/8" X 18" AIRCRAFT RUBBER CORD - ENDS FASTENED WITH 3/4" CLIP FOR 3/8" ROPE AND WRAPPED WITH VINYL TAPE.
16"
SPRAYER NOZZLE HOLDER - 2" X 18" THINWALL TUBE WITH DISC WELDED TO BOTTOM END AND 5/16" X 2" COPPER DRAIN TUBE SOLDERED IN CENTER OF DISC.
1/8" X 1 1/2" STRAP IRON - 4" R.
3/16" X 1" STRAP IRON - 3 7/8" R.
3/8" X 12" X 18" EXTERIOR PLYWOOD BASE

FIG. FIVE: — Details of 3-gallon hand sprayer rack.

on the truck while it is under pressure. The pressure should be released before the sprayer is returned to the rack following its use.

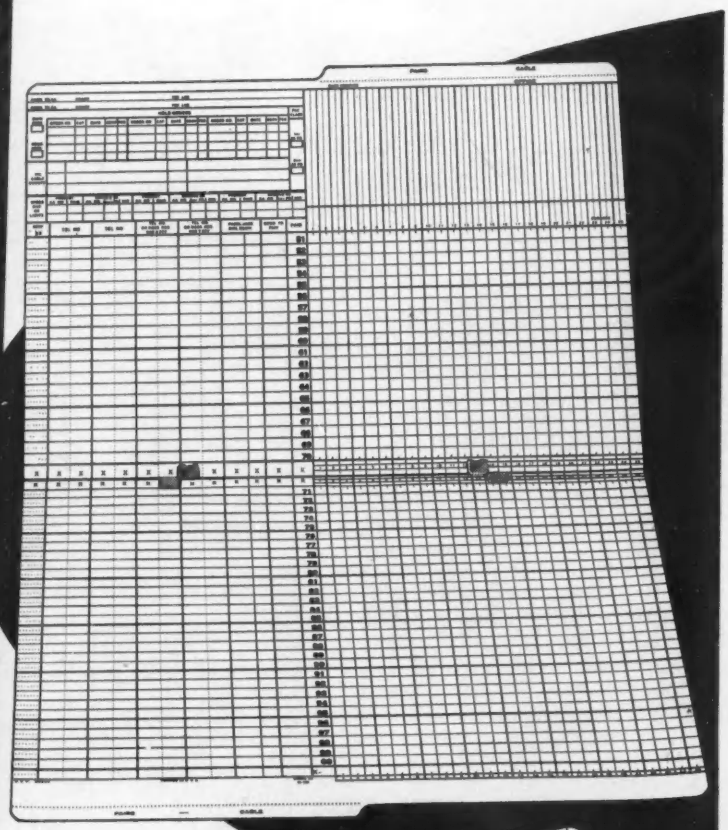
Tree and Brush Control Programs

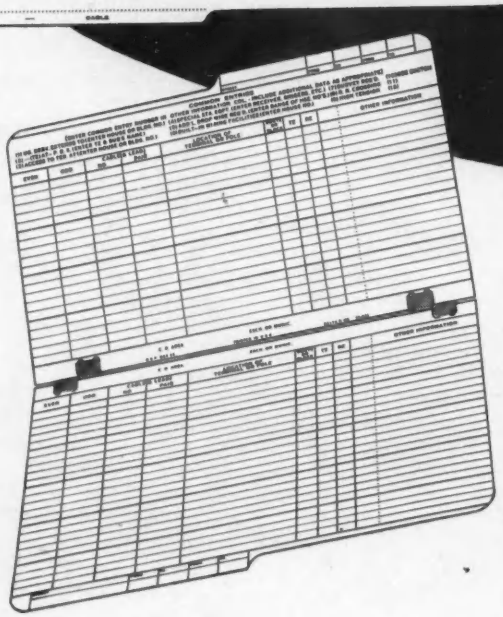
The goal to be achieved in chemical spraying of trees and brush is to reduce maintenance of telephone lines to an economic minimum. Plant growths must be retarded to the point where the spraying cost is absorbed through savings in line maintenance costs. This point is reached when tree and brush

More Data For Your "SPEC BOOK" on Page 75.

ACME VISIBLE

CABLE AND TERMINAL





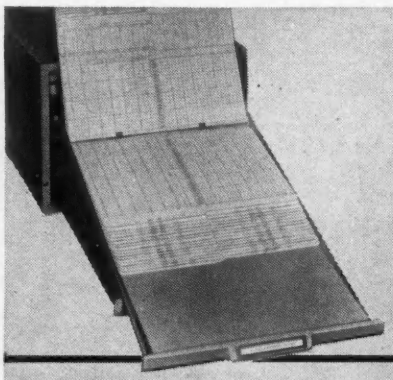
Designed by experienced telephone personnel to accommodate all of the various conditions encountered in the preparation of terminal assignment, exchange subscriber cable, and related basic plant records, in accordance with approved system practices. Simplifies and speeds the work of assignment. Adaptable for large, intermediate and small centers with the flexibility to meet the requirements for peak and normal work loads, varying number of cables, and other local conditions.

CABLE ASSIGNMENTS

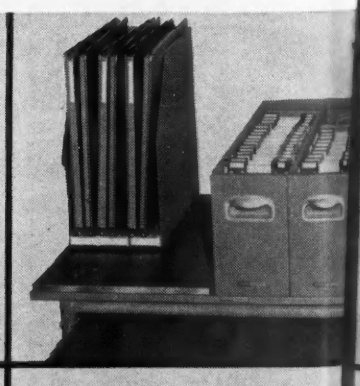
Cable assignments forms. With preprinted pair numbers, filed in numerical sequence, exposing a 50 pair complement. Cards are of special Acme Endurex rag content stock to permit repeated erasures and changes. Forms available for 50 terminal capacity and 8 party stations; 44 terminal capacity and 10 party stations; and for open wire.

TERMINAL ASSIGNMENTS

Terminal assignment forms. Eliminate the necessity of referring to supplementary maps to determine the correct distribution cable terminal. Forms available for distribution by (1) street, block or alley; (2) office building or apartment; (3) exchange wire.



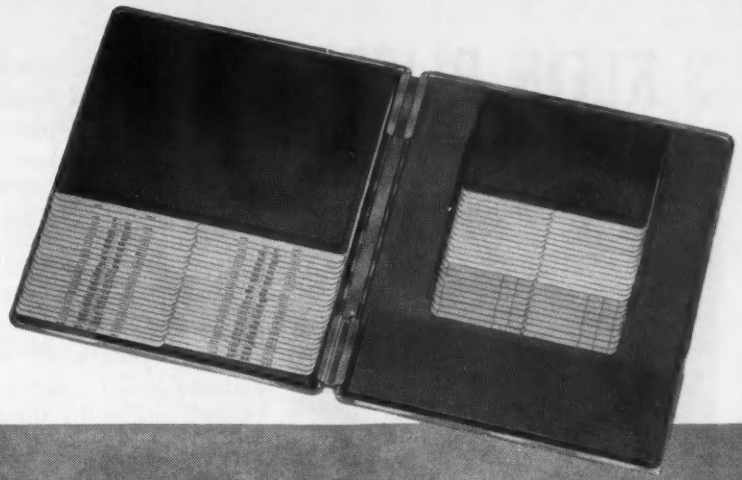
Visible cabinets are available in a number of sizes. Each tray has a maximum of 102 forms or the equivalent of 5,100 cable pairs. Cabinets can either be stationary on stands or desks, or mounted on turntables.



Portable stand with sliding shelf, ca assignment book rack holding th books and three vertical trays for s scriber line cards. Developed smaller telephone offices where individual handles both cable ass ment and subscriber line cards.

Rotaries p in a comp availability persons. perated placed nex ever conve

ASSIGNMENTS

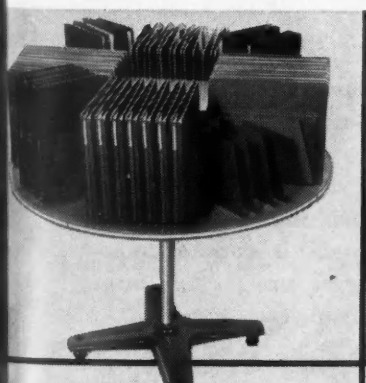


A TOUCH OF A BUTTON BRINGS THE RECORD TO YOU

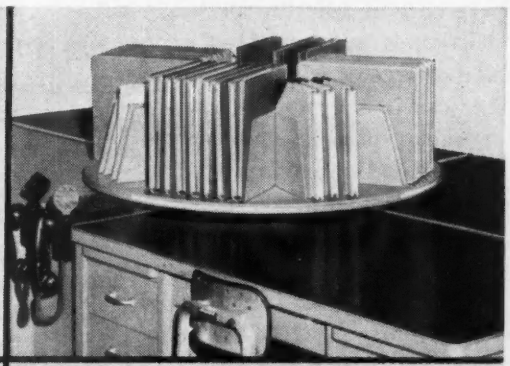
Individuals seated at rotary need not move about to reach records. Books slide in and out without any lifting. Rotaries provide accessability to records at many points around circumference, and permit clerk to do a complete cable throw.

They are designed to house a multiple number of light-weight metal-edged visible books containing many thousands of records.

Motorized Rotary and 6-position Desk Assembly with push-button controls at each position. One of many sizes available for Plant Department Records; and other central-control requirements.



Rotaries provide tremendous capacity in a compact area and permit instant availability of records to one or more persons. Rotary on pedestal, hand operated and desk height, may be placed next to or between desks, wherever convenient.



This illustration shows rotary placed at the junction of four desks . . . easily available to four persons. Visible card books are filed between spaced divider fins with intermediate divider openings for filing other papers, etc.

Acme Visible Equipment is designed for telephone use by Systems Engineers in close cooperation with practical, experienced telephone experts.

Call upon our experience—nationwide sales and service to the telephone industry.

ACME VISIBLE RECORDS, INC., S-559
Telephone Division, Crozet, Virginia

Please send us illustrated booklet of equipment specifically designed for Telephone Companies.

☐ **We are interested in Acme Visible equipment**

for_____**records.**
(kind of record)

Check department:

☐ **Accounting** ☐ **Commercial** ☐ **Plant**
☐ **Traffic** ☐ **Engineering**

☐ **Have representative call. Date**_____ **Time**____

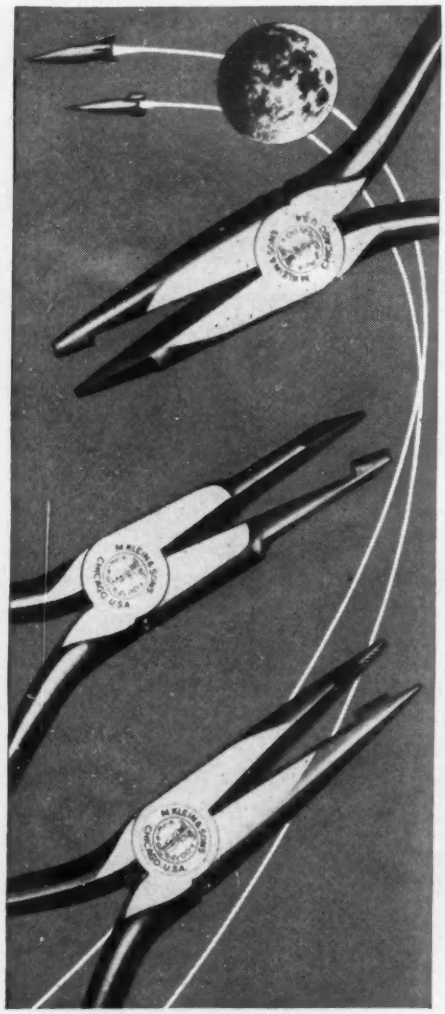
Company_____ **Attention**_____

Address_____

City_____ **Zone**____ **State**_____

3 KLEIN PLIERS

to make electrical wiring easier



Three newly engineered Klein Pliers which will solve difficult problems in the wiring of electronic assemblies.

ALL-PURPOSE ELECTRONIC PLIER

Shear blade cuts flush and holds clipped end of wire—Requires no sharpening; will cut hard or soft wire. Smooth, continuous action prevents shock which may damage resistors. For bare wire up to 18 gauge. Patent pending.
No. 260-6—length 6⅜"
No. 260-6C—with coil spring that holds jaws open.

NEEDLE-NOSE PLIER

Similar to No. 260-6 but nose has been slimmed to permit use in confined areas. Patent pending.
No. 261-6—length 6⅜"
No. 261-6C—with coil spring to hold jaws open

PLIER WITH KNIFE AT TIP

Jaws behind blade hold clipped wire end
A shear-cutting plier that will cut hard or soft wire. Coil spring to keep jaws apart. Pat. No. 2,848,724.
No. 208-6PC—length 6⅝"

Write for Catalog 101-A, which shows the complete line of Klein Pliers, including 20 pliers recently developed.

Mathias Established 1857 KLEIN & Sons Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45 ILLINOIS

the customer's telephone. Underground telephone lines go in fast. As many as 25,000 plow-feet of cable reportedly have been laid in five hour's plowing time.

Illinois Bell is not alone in using this method of rural telephone line construction; telephone companies in Michigan and Indiana are turning to the underground system of rehabilitating and extending rural lines rather than using the aerial method. For example, Michigan Bell Telephone Co., has rented an International 350 Diesel and a Farmall 450 Diesel, equipped with specially modified subsoilers to lay telephone cables through the upper peninsula and International 300 Utility Tractors and special equipment are being used to install lines in Indiana.

International Harvester's "traction control" feature that automatically increases traction by transferring implement weight and downward force of implement suction to the rear wheels of the tractor as the load increases, works well in cable laying work as in farming.

Torque amplifiers on tractors also help to get the job done even faster, enabling the operator to reduce travel speed on-the-go for working in close quarters, or to increase pull-power to meet difficult soil conditions, all without changing the throttle or stopping to shift gears.

So far, the rehabilitating of many rural telephone systems underground has been accomplished through the use of farm tractors, loaders, and subsoilers modified locally to do the job. It is reported that a wire and cable laying plow is being specifically designed to fit any suitable farm tractor for use in extending and rehabilitating telephone service in rural areas.

QUESTION: — In discussing plastic coverings for telephone cables, the term "environmental stress cracking" is used. What is the exact meaning of this term?

ANSWER: — This term is commonly employed to describe the effect of exposure of polyethylene to certain deleterious substances such as soaps and detergents. This is manifested as cracks in the polyethylene sheath of cables placed in underground conduit. (Housewives have observed a similar effect on polyethylene dishware that has been immersed in strong detergent solutions. In this instance, there is a blistering and peeling of surface layers of the polyethylene.) The trouble is caused by rupture under stress of low molecular weight fractions of the polyethlyene. Cable manufacturers employ high molecular weight polyethylene which resists the environmental stress cracking to a much greater extent. The use of soaps for lubricating polyethylene sheathed cables being placed in conduit is avoided, a neutral type of lubricant known as betonite being employed instead.

QUESTION: — In our location, we are having trouble with falling moss on our open wire lines. If the moss stays on the line wires for any length of time, corrosion sets in and soon the wires are weakened and break. The trouble is worse at transpositions than at straight line insulators. What is the remedy?

ANSWER: — Debris on open wire lines is a common problem because of trees growing on the rights of way occupied by the telephone line. In the case of Spanish or long

HOW THE WEBSTER ELECTRIC Teletalk can...

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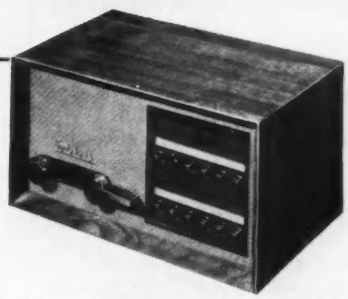
New 1200 series Teletalk intercommunication equipment has been especially designed for telephone company use to help you provide inter-office and inter-building communication for your commercial and industrial customers — *utilizing standard telephone circuits*. This will in no way affect telephone conversations in the same or adjoining cables.

Teletalk is available from Graybar — nationally. Through a wide variety of models and circuit possibilities, you can fit Teletalk exactly to the needs of each individual customer. Wherever there is a need for amplified communication, a discussion of Teletalk convenience can lead to an immediate increase in your lease revenue. Call your nearby Graybar office for full details or write for Bulletin MI2AI-1. 810



Above: This 12-station master unit of the new Teletalk 1200 Series can be connected to provide secretive or non-secretive communication with other stations. Models are available from six to 48 station capacity. Below: Two-way conversation is provided over zero-level telephone lines with this Teletalk RM-B (AC) remote speaker station. Contains its own power supply, amplifier, attenuating pad and line-matching transformer.

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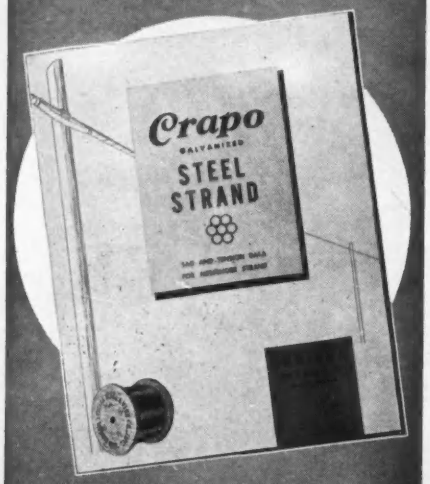
Sag and Tension Data For Strand When Supporting Telephone Cable

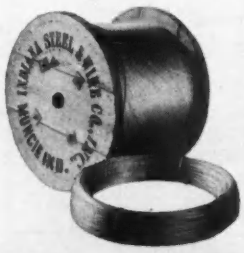


WRITE FOR THIS NEW MANUAL!

Those who design, build and maintain aerial telephone cable lines will find the technical information in this manual both pertinent and useful.

The sag and tension data cover three sizes of "Utilities Grade" strand when used as messenger to support plastic-sheath or lead-sheath cable. These data will be helpful in determining the size of strand to be used for a particular weight of cable and span length, and in answering other questions relating to design problems.

This Manual will be mailed without obligation to all interested telephone men. Ask for Manual No. MS-58.



Crapo Galvanized Steel Strand (for both messenger and guys) is available in all standard sizes and grades and in Class A, B and C coatings.

INDIANA

STEEL & WIRE CO., INC.
Muncie, Indiana

moss, the problem is aggravated by the fact that the moss retains moisture in a humid climate and current flowing in the wires creates an electrolytic effect in which the wires are corroded to the point where they break. Tree wire, which is insulated wire, will prevent this trouble. The alternative is to patrol the lines at regular intervals to remove the moss as it accumulates on the line wires. This operation may be performed as part of a standard maintenance program in which the open wire leads are inspected for defects and repairs made as these are found.

For exchange circuits, the use of cable or rural distribution wire in the most troublesome sections of the leads may provide a permanent solution. In the case of toll circuits, radio or microwave may be economically justified when maintenance is excessive because of continually falling moss.

QUESTION: — Recently there was a case where service was provided to a new subscriber on two good wires from defective pairs because no other good complete pairs were available for a held order. Is there any harm in this method?

ANSWER: — Ordinarily this is not a good practice because of confusion that might result in the records, but it can be done in an emergency when one side of a pair is open or grounded and one side of another pair is similarly affected, and the pairs are in the same cable. Such an arrangement should be temporary and a regular good pair should be assigned to this subscriber just as soon as it is made available.

QUESTION: — We have been experiencing trouble with plastic jacketed cables dancing in high winds. We never had this trouble with lead covered cables in our area. What is the cause of the trouble and how can one prevent this dancing effect?

ANSWER: — Plastic jacketed cables are lighter than corresponding sizes of lead covered cables and when lashed to a rigid messenger, they will tend to oscillate from the eddy effect caused by a strong wind blowing transversely across the cable spans. A slight vacuum is created on the lee side of the cable and messenger and there are eddies or swirls in this area. This effect is most pronounced with a uniform surface and the eddies produce a cumulative effect which causes the cable to rise and fall in a regular rhythm. In a long span, the cable will jump up and down as much as four or five feet.

The most practical method of preventing cable dancing is to twist the cable around the messenger at every other pole. This is easily done by removing the through bolt and, leaving the suspension clamp attached to the messenger, using the bolt as a lever to twist cable around strand.

This twisting operation is continued until the cable is spiraled around the messenger for a distance of about 20 feet on each side of the pole. It will be necessary to loosen the cable lashing clamps terminating the lashing wire to permit the wire spirals to adjust as the cable is twisted. Cable guards should be placed at the suspension clamp and lashing clamps to protect the cable. The guard at the suspension clamp is left in place after the through bolt is fastened back in the pole.

Revised Antenna Handbook

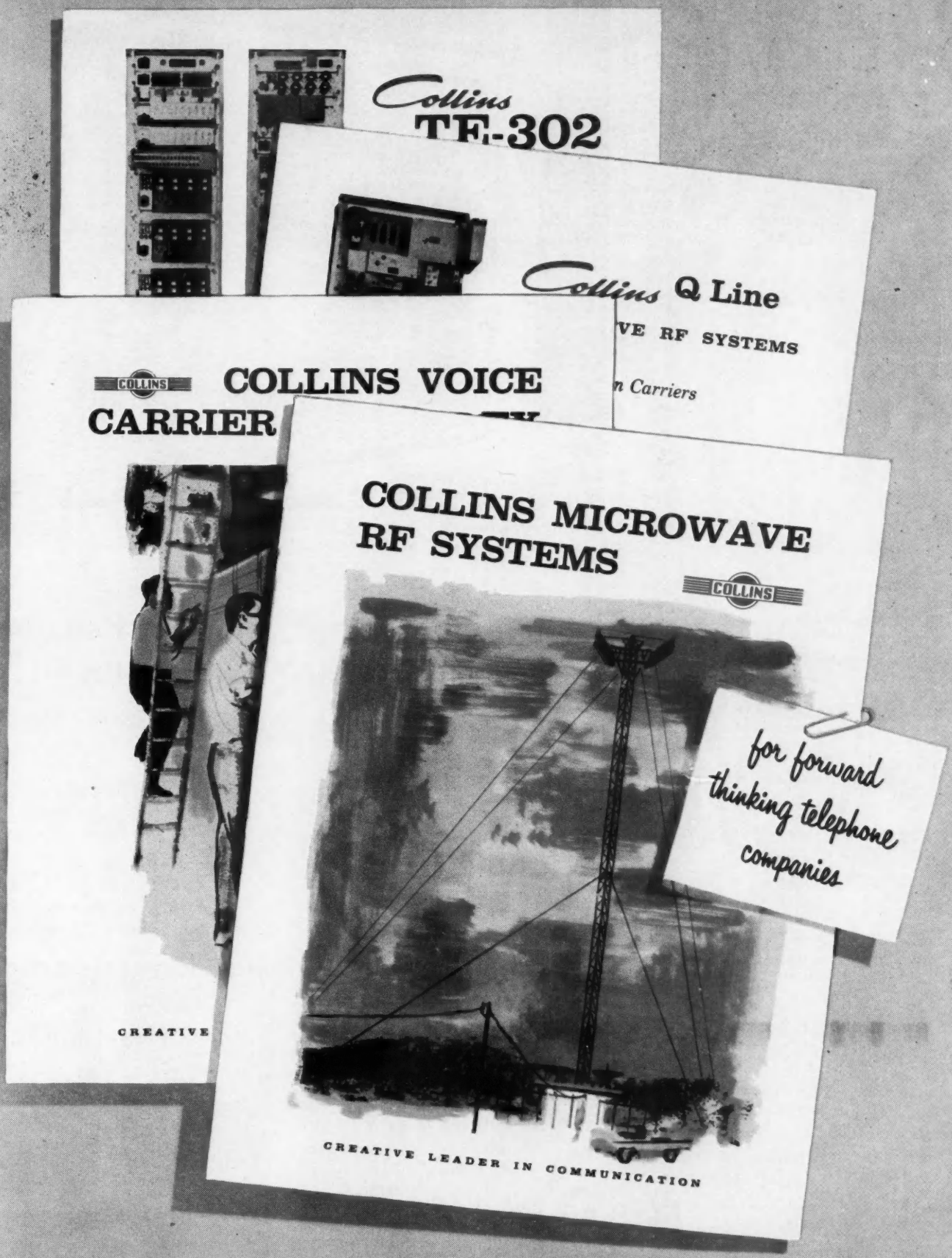
A REVISED and expanded second edition of its Antenna Handbook, now almost doubled in size and scope over the previous edition, has been published by Special Products Division of I-T-E Circuit Breaker Co.

Designed as a comprehensive aid for engineers on radar and microwave antenna systems, handbook provides detailed material for mathematical conversions and estimating:

1. Performance of a given antenna system.

2. Physical antenna characteristics required to achieve desired performance.

Copies of the new Antenna Handbook may be obtained by inquiry on company letterhead to *I-T-E- Circuit Breaker Co.*, 1900 *Hamilton St., Dept. TE&M, Philadelphia* 30, *Pa.*



a sensible step in your evaluation of microwave would be to send for Collins literature . . . RF, Carrier, Carrier Telegraph.
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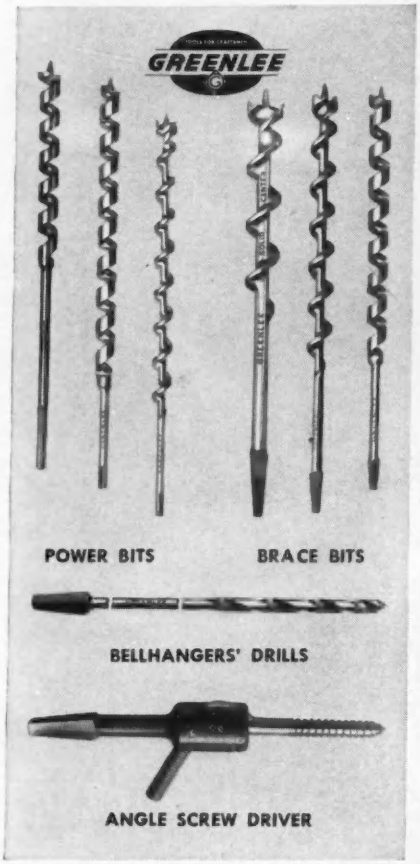

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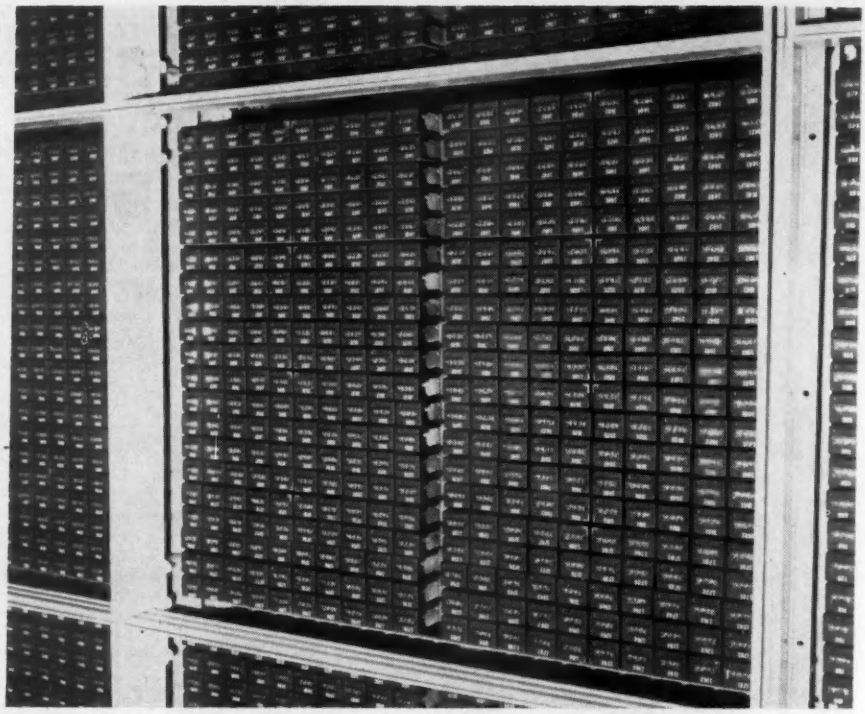

FIGURE ONE: — New York Tel. Co.'s message register boards. Each block of 25 registers is marked off on register frame to facilitate camera positioning.

Camera Photographs Monthly Readings of Measured-Service Register Board

JOHN P. THOMPSON

ACCURACY, speed and simplicity are desirable in any process, in any business; and oftentimes in these days of specialization, it is wiser and more economical to produce segments of efficient operation rather than try to "do it yourself."

A telephone company uses the products of many manufacturers in striving for maximum efficiency of operation. One particularly interesting application involves the T-6 Factograph Camera, a product of Graflex, Inc.

The development of this camera was the result of cooperation between personnel from Bell Telephone Laboratories and Graflex, Inc.

The T-6 Factograph Camera is used in many telephone central offices to photograph monthly readings of measured-service registers for billing tabulation purposes.

The camera photographs 25 message registers at one time. Speed of operation is further enhanced by using a continuous roll of sensitized paper supplied in daylight-load cassettes on which eight exposures can be made — 2,000 message registers per roll — and the camera cycle time is only three seconds per exposure.

After each exposure the paper is automatically advanced and at the

FIGURE TWO: — On a specific day each month HOWARD KLIPFEL loads the camera and takes a picture of each block of 25 message registers.

end of the roll the camera action stops automatically. Illumination for each exposure is provided by a built-in electronic flash unit (strobe type) that will last for a long period, and distortion due to camera movement is kept at a minimum by having a flash duration of approximately 1/800 second.

Details of complete measured-service billing procedure may vary, but the modern system used at the New York Telephone Co. Western Division Headquarters, in Buffalo may serve as a model.

On a specific day each month Howard Klipfel loads the T-6 Factograph Camera and takes a picture of each block of 25 message registers (see *Figure Two*). *Figure One* shows message register boards. Each block of 25 registers is marked off on the register frame to facilitate camera positioning and the same sequence of pictures is taken every month.

At the Buffalo office, Mr. Klipfel starts with highest numbers and works progressively toward the lowest numbers. The finished roll will then have low numbers to high numbers reading left to right.

The camera is then unloaded and the exposed roll is taken to the T-6 Factograph Processor for processing. This Processor automatically develops, stabilizes and dries the roll. Total process time is only seven minutes and a permanent, direct-reading print is produced, eliminating the necessity of printing from a negative.

Dependability of processing results is insured by having chemical kits furnished that contain the exact amount of processing material needed for the solution used in the processor. No photographic experience is required of a new operator.

After the roll has been processed it is sent to the Billing Department where it is cut into strips containing 100 readings. An IBM operator then places the strips in an automatic illuminator which lights each number successively (see *Figure Three*).

Collated IBM cards are placed in the key punch machine and as each successive register reading is illuminated the operator punches the reading in the corresponding IBM card.

Subsequent IBM operations automatically subtract the previous month's reading from the current month's reading, establish the billable number of calls, and do the actual billing. At the conclusion of the billing process the Factograph message register strip is filed for information

Next page, please

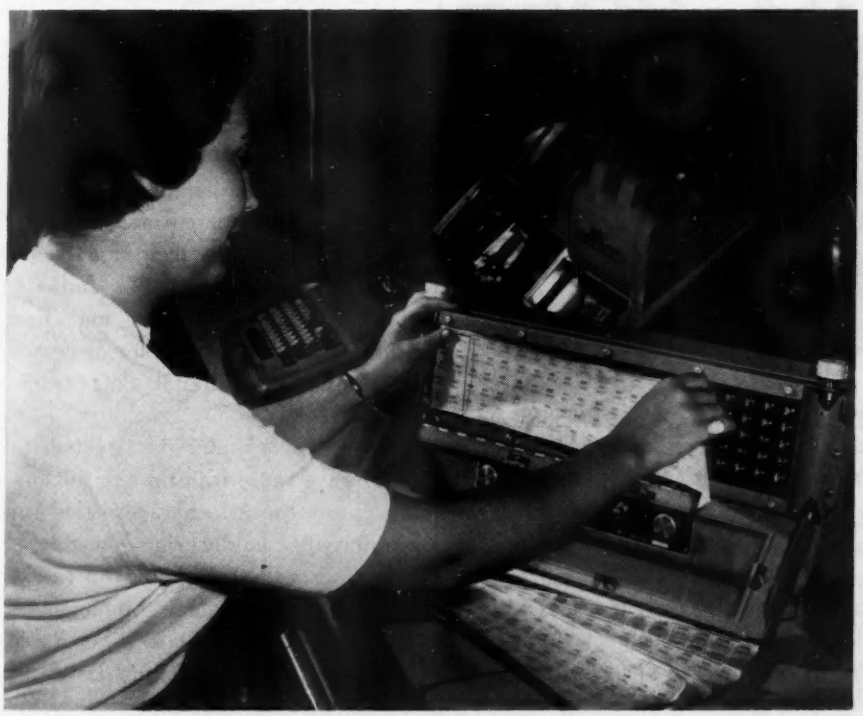

FIGURE THREE: — Billing department cuts processed roll into strips containing 100 readers. IBM operator places strips in automatic illuminator which lights each number successively.

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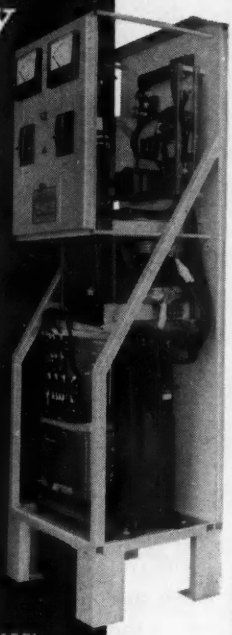

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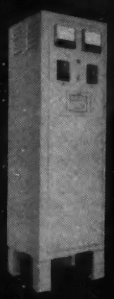

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*One-Way Answer only

For further information on Model AS-1, write to **MacKENZIE ELECTRONICS, INC.**, 145 W. Hazel Street, Inglewood, California.

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Title _____

Address _____

and reference purposes. The strips are dated and the photograph of the actual register provides exact, indisputable evidence as to the number of calls recorded to that date. Empty cassettes are placed in handy mailing tubes and returned to Graflex where they are immediately reloaded with T-6 Factograph Sensitized paper and shipped back to the Telephone Company for reuse.

T-6 Factograph equipment is now in use in many of the major cities in the United States. Its wide acceptance and successful operation is an excellent example of the good that can come when the talents of two different industries combine to solve a problem. — *John P. Thompson.*

Lenkurt Issues Book On Carrier and Radio

A NEW 208-page book, "Carrier and Radio Articles Selected From The Lenkurt Demodulator," has been published by Lenkurt Electric Co.

The 32 articles in the book appeared originally in Lenkurt's technical magazine, *The Demodulator*, which has been published monthly by the telecommunications firm since 1952. Included are many articles from back issues which are no longer available.

Illustrated and indexed, the newly published volume is divided into three chapters.

The opening chapter presents seven articles on equipment measuring and testing techniques, with explanations of units and discussion of terms.

The next chapter covers open-wire and cable facilities, including transmission line characteristics and applications, line treatment and line equipment. Another chapter discusses telegraphic and digital data transmission.

The final chapter is devoted to microwave radio transmission including propagation characteristics of microwaves, engineering considerations for radio routes and operation of basic high-frequency components.

The hard cover book is available for $2.50 from The Lenkurt Demodulator, *Lenkurt Electric Company, 1101 County Road, Dept. TE&M, San Carlos, Calif.*

TELEPHONE ENGINEER & MANAGEMENT'S

PLANT MAN'S 'SPEC' BOOK

(11) Tree and Brush Control — Chemical Spraying

interference with the wire lines is a rare occurence, thus practically eliminating service interruptions and repair expenses from this cause.

Labor and material for spraying are expensive even though the final results are worth the cost. It is therefore important to restrict the spraying operations to eradication only of trees and brush that grow to heights where they will cause interference to overhead line wires. Low growing plants such as sumac, wild plum, azalea, huckleberry, and laurel are best left alone, unless the property owner insists on their removal. These short growths rarely cause line interference and, in addition, they will prevent other species of trees and brush from gaining a foothold on the right-of-way. They also provide cover for birds and small animals, thus becoming an important factor in wild life conservation.

Some forms of shrubs may grow into contact with line wires that clear the ground with barely the minimum legal clearance from the ground along fenced right-of-ways. In leads with only a few wires, it will be found more economical to set taller poles (for example, 20 ft. to replace 16 ft. poles) in locations of clumps of these low growing plants, than to attempt to eradicate the shrubs. Alternatively, crossarms may be placed on poles that have more than one pair of wood brackets to replace all brackets on the poles and thus obtain permanent clearance.

In a program involving the extensive removal of growths along rights-of-way, it is important to make a preliminary survey of the area and contact the property owners or their agents for permission to spray along the rights-of-way abutting the properties.

TELEPHONE ENGINEER & MANAGEMENT'S

PLANT MAN'S 'SPEC' BOOK

(12) Tree and Brush Control — Chemical Spraying

BRUSH ERADICATION
INSPECTOR'S REPORT

Exchange Western Inspector John Doe

Mile Number	Permission Granted By	Mile Number	Permission Granted By
51-A	James Wren		
51-B	Richard Robin		
51-C	Paul Swift		
51-D	Peter Quail		
52-A	Thomas Finch		
52-B	William Lark		

Spraying Completed - Date 1-12-51 By Richard Roe

FIG. SIX: — Typical inspector's report used in brush eradication work.

The report form shown in Figure 6 will be found useful for recording the work to be done and the property owners granting permission to eradicate the brush along the right-of-way abutting his property.

TELEPHONE ENGINEER & MANAGEMENT'S

PLANT MAN'S 'SPEC' BOOK

(13) Tree and Brush Control — Chemical Spraying

This report lists the following information:

(a) **Exchange** — Name of exchange.

(b) **Inspector** — Name of person conducting inspection.

(c) **Mile Number** — Mile number obtained from the rural plant record map for the exchange involved. Where several properties are in the same mile, each portion is indicated by a letter suffix as A, B, C, etc.

(d) **Permission Granted By** — The name of the property owner giving verbal permission.

If a Federal or State Highway is involved, it is very important that written permission be obtained from the proper authorities for spraying along the highway.

In addition to filling out the inspector's report, the inspector is to spot on the exchange plant record map the approximate locations of the brush to be treated, marking them as A, B, C, etc., in line with the designation on the report.

The crew assigned to the spraying work is given a copy of the inspector's report and the marked plant record map to guide the men in this work. On completion of the assignment, the report is signed to show that the job has been done. This report then provides a record for future reference.

The new "Plant Man's 'Spec' Book" will appear in each issue of "Telephone Engineer & Management." We urge all readers to read and file these informative 'Spec' book sheets.

More Data For Your "Spec Book" In The Next Issue.

Plastic Spacer Unit Developed by Preformed Line Products Co.

NEW PRODUCTS' SHOWCASE

By DICK REYNOLDS

Plastic Spacer Unit

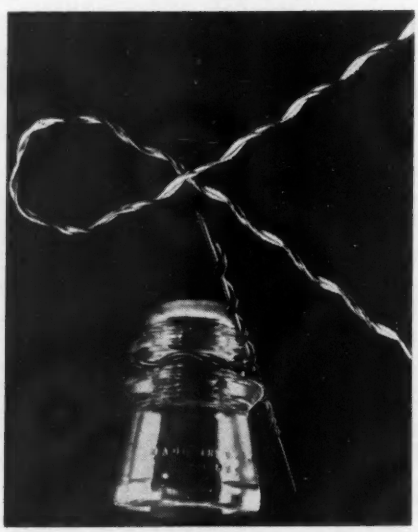
MID-SPAN slap on open line wires can now be eliminated by use of a Plastic Spacer Unit developed by Preformed Line Products Company. PSU is the designation for the one-piece spacer, which can be installed on existing lines as well as on new construction.

The Spacer, made of high-impact vinyl, is a squared-off "U" with helical legs formed to snug the lines. The model, now available, controls spacing between wires at 5 inches and accommodates full range of open line wire diameters. Other Spacers are also available for 6, 8, 10, and 12-inch spacing on request. *Check NP* 189.

Communications Tie

PREFORMED Line Products Co. has also developed a new communications tie for uniform attachment of open line wire to insulators. Direct contact between the conductor and the insulator is eliminated, because the tie holds the conductor away from the insulator.

Application is made by wrapping one leg of unit onto the conductor, seating the loop of the tie in the groove, and then wrapping the other



leg onto the conductor. The color coding used to identify sizes serves as an installation reference mark.

Made of galvanized steel or Copperweld, the tie is a one-piece unit designed for specific insulator and wire sizes. *Check NP* 190.

Carbide Drills

STAR EXPANSION Industries Corp. has announced new carbide drills that will make accurate holes up to 3 inches in depth. Self-cleaning spiral flutes discharge pulverized masonry from the hole.

A set of four drills is available in a plastic case with plastic cover that folds back to set up for counter display or work bench. When not in use cover may be closed and set carried in pocket or tool chest. Set consists of one each — 1/4″, 5/16″, 3/8″ and 1/2″, Peak Drills, the shanks of

which fit standard 3/16″ electric or rotary hand drills. *Check NP* 191.

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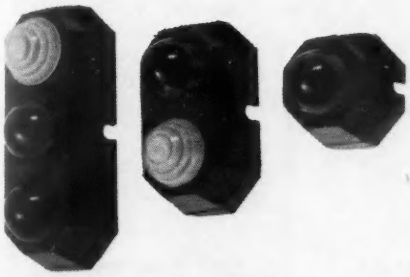

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SE 18	Indicator Light	(3 lamps)	$4.70

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Specify **ANSONIA** Inside Wiring Cable, Type 1255. You get economy plus ease of installation. Conductors, insulated with 12 mils of color-coded plasticized polyvinyl chloride, are paired and cabled with steel rip wire to facilitate stripping. Supplied in 22 and 24 gauge (brown or ivory) vinyl jacket with #29 rip wire. Be *sure* to get **SUTTLE's** quote on your needs.

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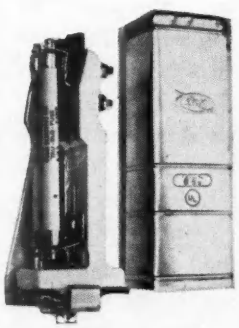
The **KELLOGG K-500** standard battery desk telephone with increased transmitting and receiving efficiency, works equally well with all classes of common battery, manual or dial service. Better speech quality is obtained through shorter handset. New, improved bias or harmonic ringers provided. **SUTTLE** stocks 'em!



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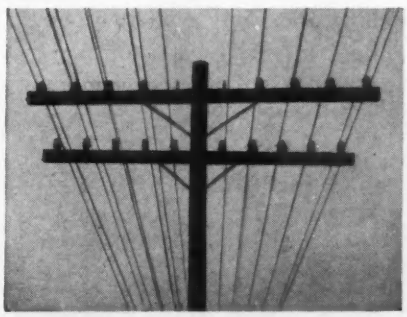
COOK ELECTRIC'S Type "O" Substation Protectors are a single circuit protector equipped with a pair of fuses and a pair of high-potential arrestors. The body is a single-piece, heavy glazed porcelain. Fuse and lightning arrestor clips are Phosphor bronze fastened to the body is a single-piece, heavy glazed are on the reverse side, thus giving instrument wires maximum protection for the hot wire. In stock at **SUTTLE'S** Lawrenceville, Illinois warehouse.



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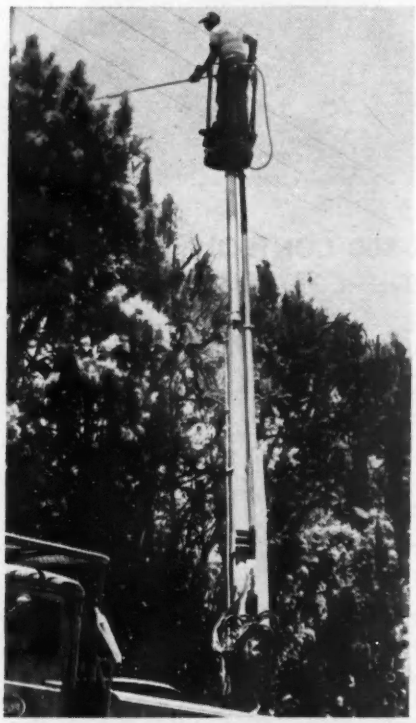
PHONE: DEARBORN 2-3108

Telescoping Boom

AN IMPROVED hydraulically-operated telescoping boom and aerial platform has been developed by the IM Division of the Peters Company.

Called the "Industrial Monkey," Standard Model "V", it reaches 40 feet 9 inches, giving an average working height of 48 feet. Designed to be mounted on 16,000 lb. or heavier truck chassis, the unit eliminates need of outriggers. All movements are actuated by double-acting hydraulic



cylinders, and work platform is automatically kept level by a double-acting cylinder at its base.

All movements are controlled by electrically-actuated solenoid valves, operated from the platform or from dual controls, which are standard equipment. Work platform is fully insulated, having a dielectric deck mounted on insulators for operator safety.

The Industrial Monkey is completely maneuverable, ranging from straight-out to straight-up, and has a 270° turning radius. *Check NP* 192.

Telephone Wire Pedestals

A NEW and complete line of REA-approved telephone wire pedestals is being offered by Line Material Industries. These pedestals facilitate above-ground splicing, termination, distribution, and loading of buried plant. They will accommodate eight single-pair wires or two 50-pair cables of which nine pairs may be loaded or 18 pairs terminated.

A non-hinged terminal mounting

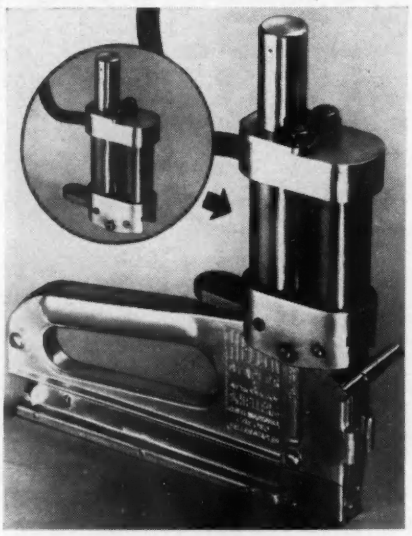
strip eliminates bunching, bending, and wear on individual pairs and accepts standard REA-approved terminals and loading coils. Overlapping box type construction provides a large working area, shielding of terminals from weather, and reduced insect contamination. Wire clips are furnished to eliminate strain on individual conductor pairs. *Check NP* 193.

Pneumatic Power Adapters

NEW power adapter from Heller-Roberts Mfg. Corp. has twin driving chambers for a balanced thrust and changes hand tackers and nailers into pneumatic drivers.

Each touch of trigger drives staple straight. Frees one hand of operator to position materials, which aids his speed. It takes two minutes to attach this pneumatic converter to a hand machine using only a screw driver.

Important fatigue factor in the hand model is down to a minimum,



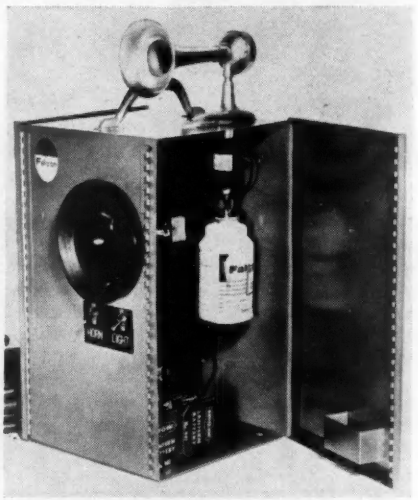
yet the machine still retains features of the hand model. The power adapter cannot interfere with the hand grip of the standard design and places one extra pound of weight at the driving nose. (The adapter adds only one extra pound to the Heller Hand machine.) *Check NP* 194.

Traffic Flasher Alarm

HIGHWAY crews are given protection against oncoming traffic by the Falcon "Traffic Flasher Alarm," a new product introduced by the Falcon Alarm Co., Inc.

To a flashing red warning light the new highway safety device adds a loud warning horn. Horn is triggered when the vehicle overrides the light and runs over an air hose placed ahead of a closed lane.

Horn and warning light are combined in a unit that is portable, dur-



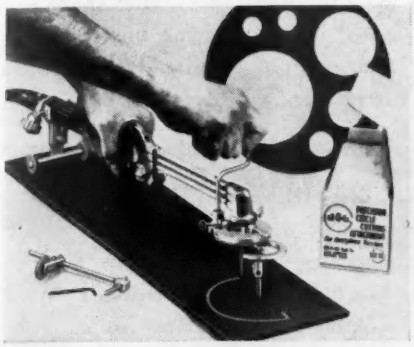
ably constructed and waterproof. The horn is mounted on a steel box container that measures approximately 10 x 10 x 15 inches high. This box houses the light, a standard lantern battery by which the light is powered, and the horn-operating mechanism which includes a replaceable can of Freon by which the horn is powered.

A separate compartment with hinged cover contains the air hose and extension wire. A hinged cover on the opposite side provides convenient access to other components for inspection and battery replacement. Exterior toggle switches allow independent operation of horn and light as desired. A carrying handle makes unit easy to lift in and out of cars and trucks, and easy to carry about.

Hinged openings are fitted all the way around with a neoprene gasket for tight waterproof closure. Light mounting is also sealed with neoprene and, for rust-resistance, the horn is plated and the box, which has a hammertone finish, is gray enameled. *Check NP* 195.

Circle Cutting Attachment

A PATENTED tool, for attachment to any acetylene cutting torch, from Ideas, Inc., permits cutting of precision holes in thick metal plate. Circular holes and solid disks, ½″ to over 12″ in diameter, are cut by turning a crank. Squares, rectangles, and odd



shapes of any size can also be formed. Developed for the US Navy, this universal attachment is used in such applications as welding fabrications and cutting holes for pipes and electrical conduit.

Being lightweight, the tool can be taken wherever work is located, rather than having to move the work to a large stationary cutter. Because of small size, it will operate in confined spaces.

A gear mechanism employed in the tool makes cutting smoother and faster than with compass-arm guides. Complete information may be obtained by *Checking NP* 196.

Hydraulic Hole Digger

A NEW ADDITION to its line of hydraulic hole diggers has been announced by the Powers-American division of McCabe Powers Body Co. New unit, designated Series EM-2 "Earth-Master" Hydraulic Hole Digger, digs straight clean holes up to 10′ 6″ deep and 9″ to 30″ in diameter.

Digger is designed for use with a "live-boom" derrick. Power is supplied by a hydraulic pump driven by a full-torque drive assembly on the truck transmission. A reversible hydraulic motor rotates the auger; automatically shifts to low speed for digging and to high speed when auger is full raised for "spin-off." A separate hydraulic motor feeds and raises the auger under power.

Auger is guided at all times by a twin-column telescopic support frame which rests on ground during digging. Frame is attached to a universal joint mounting bracket on derrick which permits digging at angles, in close quarters and hard-to-reach spots. Power feed of auger, combined with down pressure which can be applied with the hydraulic derrick, enables unit to dig quickly in any type of soil.

EM-2 Hydraulic Hole Digger.

When not in use, digger unit stows in brackets on the derrick and can be easily removed or transferred to another vehicle. Special auger heads can be supplied for use where soil conditions retard normal efficient operation. For further information, *Check NP* 197.

3-Speed Hydraulic Digger

A NEW high-torque 3-speed hydraulic digger with auger torque up to 8,400 foot-pounds has been developed by Holan Corporation.

Labeled Series 5400 Earth Borer, digger has three speed selections: (1) low speed with high torque (2) a higher speed with lower torque and (3) a spin speed.

A positioning cylinder located on the power feed bracket has several important functions. It corrects for the travel arc of the derrick and assures straight holes, provides more clearance while setting poles, and can be used for aligning auger when digging anchor holes at an angle.

Swivel mounted, the Series 5400 has universal action, and tilts and

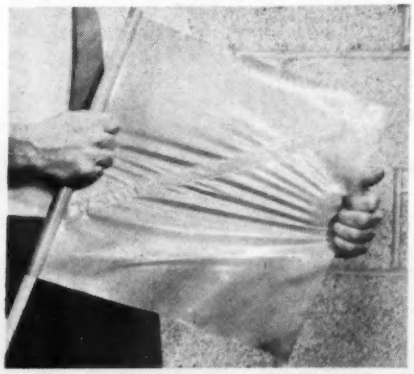
swings any way the operator desires. All bearings are of the anti-friction type. The digger is available with 1000 psi or 2000 psi systems. Maximum torque possible is 8,400 foot-pounds. *Check NP* 198.

Luminous Warning Flag

NEW TYPE warning flag from Industrial Products Co. is uniformly bright on both sides, giving extra visibility — day or night. Thermally reinforced edges provide high tear strength.

Next page, please

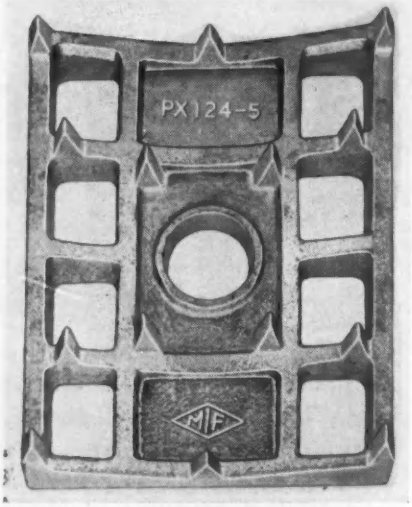
Tests have shown that it will not fade or discolor and is resistant to abrasion and temperature extremes. Diagonal reinforcing stay assures



windproof action. Furnished standard in a special luminous red in sizes 13″ x 13″, 16″ x 16″ and 18″ x 18″ — complete with wooden staff. Also available in high visibility yellow and yellow-red combinations and in grommeted and special styles. For complete details, *Check NP* 199.

Grid Gains

POLE HARDWARE Division of Malleable Iron Fittings Co. has announced a new line of Grid Gains. A basic feature of the Grid Gain is provision for sufficient area contact on wood members to distribute load over entire area engaged rather than concentrating it on wood surrounding bolt hole. Design incorporates various

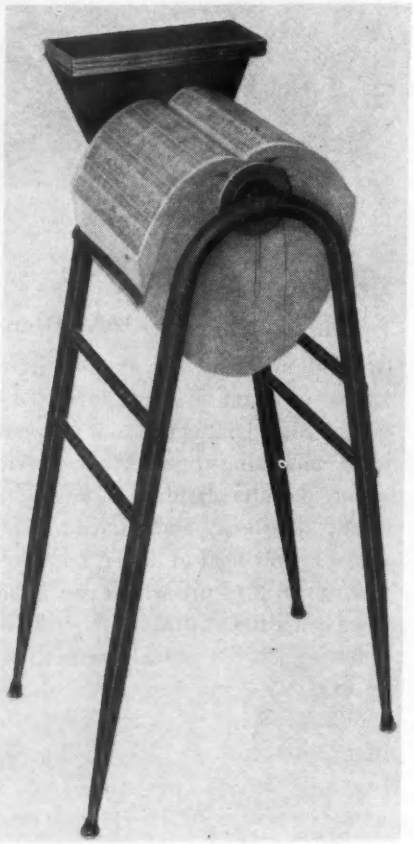


shaped teeth and ribs, so placed as to grip pole surfaces both parallel with and perpendicular to grain. Rectangular, curved pole contacting surface offers maximum area contact over a range of pole diameters, resulting in reduced bolt slotting under normal loads and the ability to transfer larger loads.

Grid Gains may be used singly or back to back at any angle, and are available in several sizes to accommodate various load requirements, and fit a wide range of pole diameters, providing maximum contact area and stability for pole diameters from 4½-in. to 16-in. *Check NP* 200.

Directory Stand

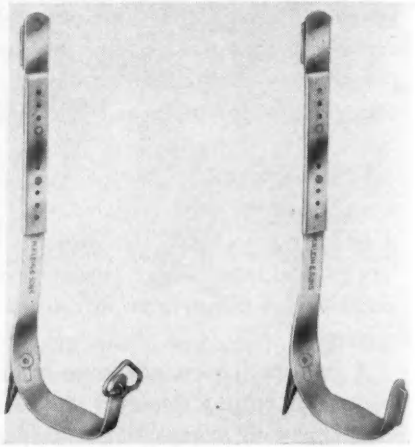
A NEW solution to directory handling problems has been announced by Benner-Nawman, Inc. Using the



same principle incorporated in the new Rotary Rack for booths, this stand has a large capacity (approx. 10,000 phone book pages) but takes little floor space. Unit is self-balancing — books stay open at selected page. Simple and easy to use and easy to read entire page — avoids squeezed-up inside columns. Helps prevent directory damage. No binders are necessary. Books are always accessible — never misplaced — and in busy locations, numbers can be noted before entering booth. Simple, tamper-proof locking device protects directories. *Check NP* 201.

Replaceable Gaff Climbers

MATHIAS KLEIN & Sons has announced development of two new replaceable gaff adjustable climbers. The gaff is held in position by a self-locking screw, and full impact when using the climber is absorbed by the



gaff and leg iron. No load is transmitted to the screw.

They are adjustable from 14-½ to 19 inches, made in matched pairs right and left. Wide stirrup gives full support. Offset shank brings gaff in proper line with leg iron. Aluminum finished, and available in two styles. *Check NP* 202.

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The Anatomy of Attrition

(Continued from page 40)

justment caused by direct attrition. But the understanding and acceptance of a seemingly endless series of price increases "because the business is growing" is a far different matter. To the public this appears to be economics turned upside down.

And (unfortunately for utility regulators and managers), this hard-to-explain, continuous form of attrition hits utilities much harder than it does unregulated business. This is due to a basic difference in operating characteristics.

Generally speaking, utilities are heavily capitalized industries. That is, it takes several years receipts from the sales of utility service to equal the cost of the permanent assets used in producing them. This is referred to as a low turnover business.

On the other hand, the annual sales of the typical unregulated business are usually several times as much as the permanent assets — high turnover.

Because of this difference, the price increases required to offset attrition caused by expansion and replacement are greater for a utility than for business generally. This is why, earlier in this article, the making of the required adjustments in utility service rates was characterized as "a complicated — and painful — task."

Why this form of attrition affects regulated business more than unregulated can best be brought out by means of a simplified illustration. The calculation (*below*) assumes that the annual physical output of goods or services per productive unit is the same for a new unit as for existing units.

In order to produce the same rate of return on the new unit as on an existing unit, the utility receipts from the annual output of the new unit must be $70 rather than $50, equivalent to a 40% increase in price. On the other hand, because of higher turnover, only a 10% increase is required in the case of the new industrial unit ($220 rather than $200).

This does not mean that, in order to offset the *full* effect of inflation, greater price increases are required in the regulated than in the unregulated field. A second glance at the illustration below will make it obvious that a proportionate rise in operating expenses (*direct* attrition) would require a greater price increase for the high turnover industry than for the low turnover utility.

The trouble lies in that the indirect form of attrition, which is the more difficult to cope with from the repricing standpoint, has a greater impact on regulated business than on unregulated business.

Rates For "The Future"

THAT "utility rates are made for the future" is axiomatic. *How* this can be accomplished, though, is far from axiomatic. This is especially true when regulation is faced with the problem of dealing with attrition.

A price increase for utility service requires regulatory approval. This usually involves the presentation and consideration of evidence in formal hearings. It usually requires the issuance of an order setting forth the basis for the decision under the applicable statutes and the evidence presented. Under such conditions, is it possible to set rates which will be adequate to offset attrition as it occurs? The answer is that this can be done — at least to a large extent. Moreover, it should be done to whatever extent is possible under applicable statutes, rules of evidence and court decisions. It is in the interest of sound regulation to do so.

Certainly regulation can and should cope in advance with the indirect form of attrition. Expansion and replacement of plant and equipment will continue to exert a depressing effect on rate of return — unless, of course, the purchasing power of the dollar were overnight restored to a level where new productive units cost no more than the average of those already in service. Certainly the latter assumption may safely be characterized as "beyond the realm."

Given satisfactory evidence of a utility's expansion and replacement program a commission can, in all propriety, evaluate future indirect attrition and authorize compensating rates. All too often, however, this evidence is either entirely lacking or is so poorly presented that the commission cannot legally justify providing in advance for indirect attrition. Consequently, not only does the utility fail to earn the return which the commission deems proper, but the commission itself is burdened with having to process rate cases at unnecessarily frequent intervals. A crowded docket brings on either hurried regulation or increasing regulatory lag. Finally there is the adverse public reaction to close interval rate increases.

The Regulatory Problem

FROM THE standpoint of dollar evaluation and of public acceptance, the task of providing the rate relief required to offset direct attrition is relatively easy — after such direct attrition has occurred. But the question of whether regulation can anticipate future direct attrition in prescribing rates is not so easy to resolve.

Faint though it be, there is always the hope that there will be a little or no further inflation. Under such circumstances, direct attrition of a rate of return would be either minor

Per Productive Unit

	Low Turnover Utility		High Turnover Industry	
	Existing	New	Existing	New
Cost of Unit	$100	$200	$100	$200
Receipts from annual output	50	70 (+40%)	200	220 (+10%)
Operating Expenses	30	30	180	180
Income Tax (50% rate)	10	20	10	20
Earnings	10	20	10	20
% Return on Cost of Unit	10	10	10	10

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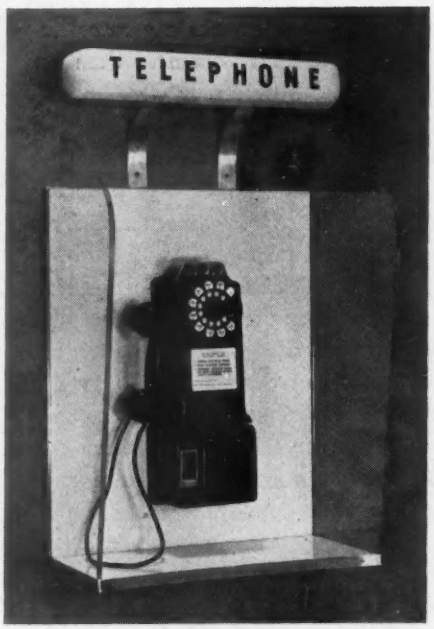

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or would disappear. The existence of such a possibility, remote as it is, cannot be entirely ignored. An evaluation of future direct attrition on the basis of past experience will probably come close to hitting the mark. But whether a rate order based on such empirical evidence can be legally justified must be weighed in the light of the situation obtaining in each individual regulatory jurisdiction.

No "Magic Solution"

THERE is no magic solution to the problem of attrition. What steps, then, have the various regulatory commissions taken to recognize the problem and to postpone the unhappy day when the utilities under its jurisdiction must come knocking on the door again with yet another showing that attrition has caught up with them? Basically, there have been three methods used in attacking this problem.

The first method is an attack on *direct* attrition and is largely dependent on the timing of the rate case with respect to major increases in the levels of operating expenses. It ordinarily consists of including in the test period results those operating expense increases (usually wage or tax increases) which have come into being after the close of the test period, but before the rate determination is made. Also included may be increases which will result from a future wage commitment or authorized tax rate rise.

To the extent that the timing of events permits such action, this method is effective, at least for the period of relatively stable expenses in the immediate future. However, many regulators and utility managements have seen rates of return decline rapidly because of expense increases occurring only a few months after rate increases were granted. This indicates the need for a fuller recognition and anticipation of direct attrition.

The second method is aimed at *indirect* attrition and involves the determination of the rate base itself. Across the country, commissions have interpreted applicable statutes in a number of ways in an effort to reduce

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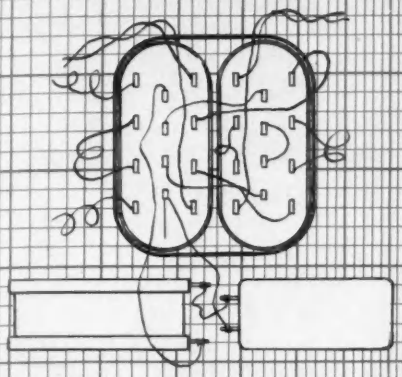

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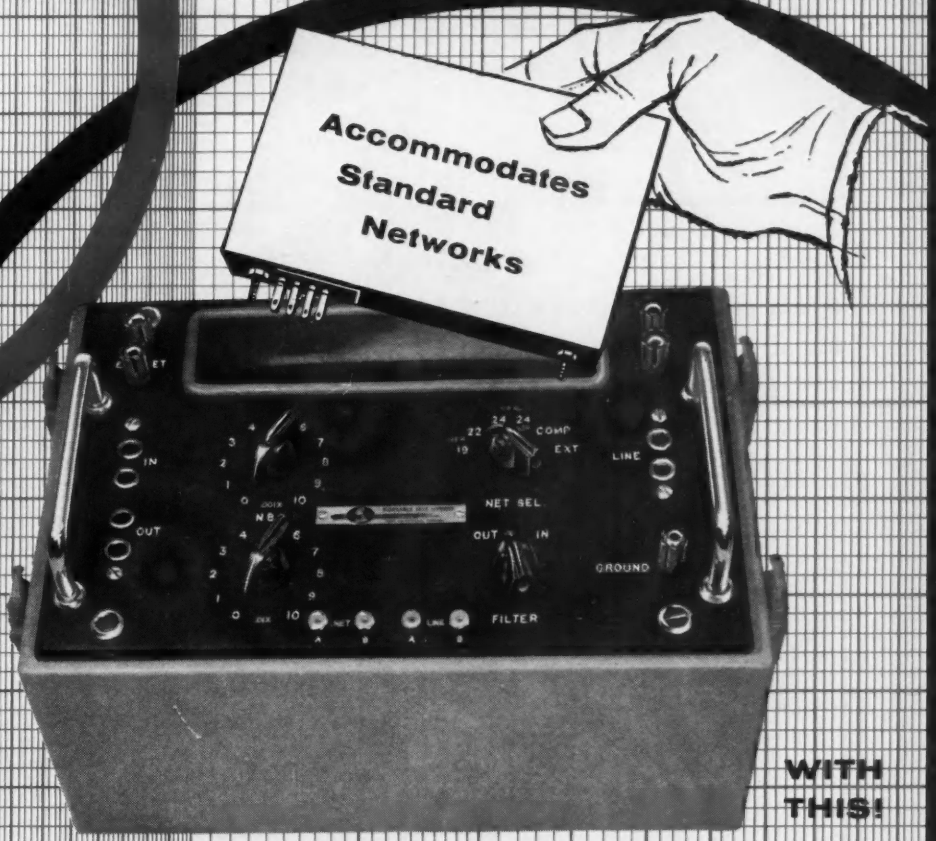

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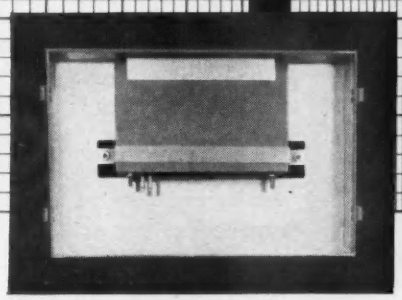

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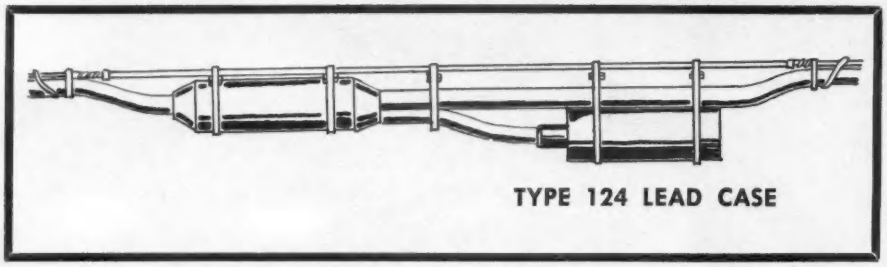

TYPE 124 LEAD CASE

STEEL CASE ASSEMBLIES

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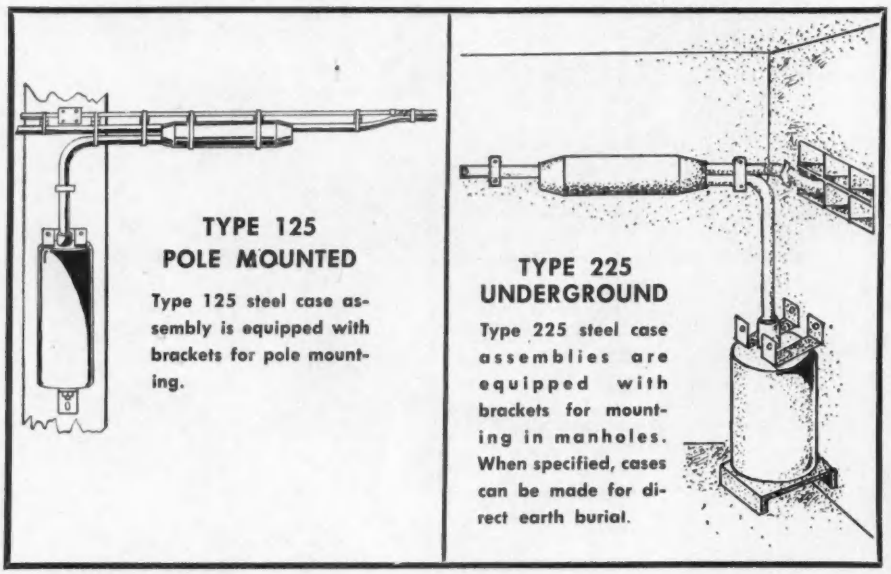

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Type 125 steel case assembly is equipped with brackets for pole mounting.

TYPE 225
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Type 225 steel case assemblies are equipped with brackets for mounting in manholes. When specified, cases can be made for direct earth burial.

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indirect attrition. One means is to recognize the "fair value" (as distinguished from "net book cost") of utility plant. Variations in this approach have ranged from a "reproduction cost new less observed depreciation" through gross book cost (with no reduction for depreciation) to recognition of a rate base only slightly in excess of the net book cost. Another means is extension of the rate base from "average for the test period" to "end of test period" or even an extension into the future, based on the utilities' construction and replacement program. All of these variations have been effective in some degree.

The third method is to set rates designed to produce an initial rate of return which is somewhat higher than that contemplated for the long pull, but with the full knowledge and realization that it faces continuous erosion.

It is not advocated here that the use of any of these three basic methods, or any combination of them, is "the best" means of coping with attrition. Perhaps that method has yet to be conceived. Certainly there are avenues which have not yet been explored, either by utility managers or regulators. But explore them we must.

American ingenuity in the fields of science, technology and the creation and marketing of new and better products and services has made tremendous strides in bringing our standards of living far above those of any other country in the world. Meanwhile, our regulatory statutes and the joint approach of utility management and regulatory commissions to the problem of rate-making have changed but little over the years. Regulated industries are returning ever more frequently for rate adjustments as the pressures of attrition act to lower their rates of return. Thus, the burden of regulation promises to grow heavier with each year. If we, then, are to keep up with the times, it is imperative that we consider some basic research in the processes surrounding rate-making aimed toward developing a long-range solution to this matter of attrition. — *P. M. Schuchart.*

in the power field

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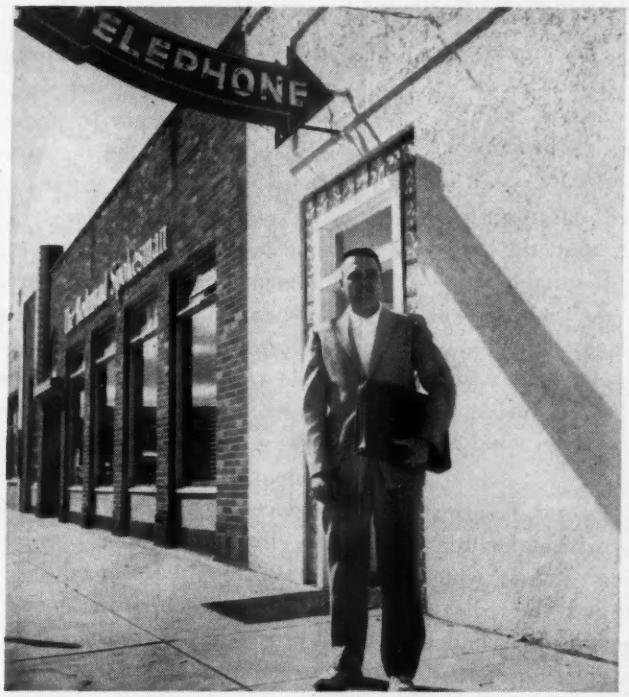
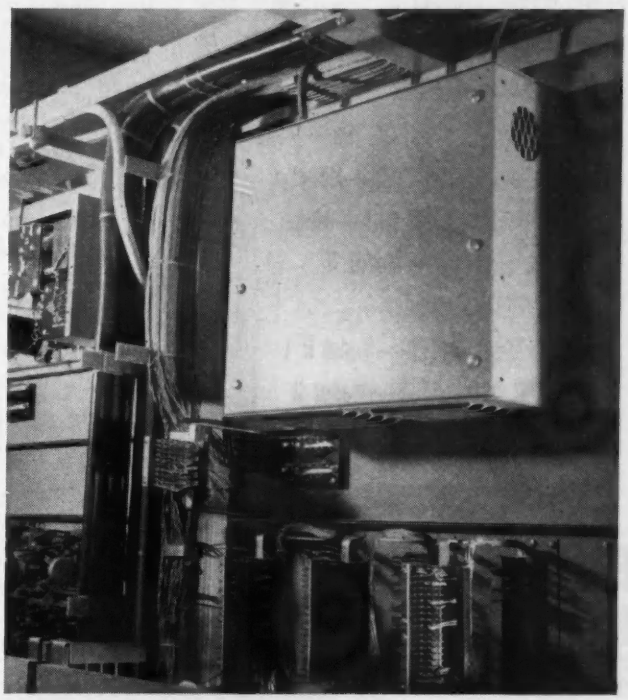
NEWS ABOUT RAYTHEON DEVELOPMENTS IN TELEPHONE POWER SUPPLIES

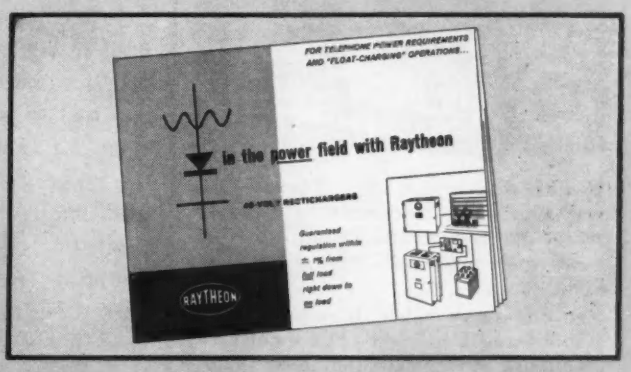
Raytheon Manufacturing Company, Industrial Apparatus Division, Magnetic Components Department, Daniel Webster Highway, Hooksett, N. H.





OREGON'S FIRST TOLL-TICKETING STATION USES RAYTHEON POWER SUPPLY EQUIPMENT

Two special Raytheon Rectifilters, W7076 and W7097, (above right) play important roles in this unique installation, located in the Redmond office of the Northwest Telephone Company. The company provides nationwide direct distance-dialing facilities to all its subscribers. The W7097 acts as a power source in series with the exchange battery identifying the party making the long-distance call. Information such as calling number, placed call and length of call is recorded on magnetic tape. The W7076 powers the read-out equipment as it lifts this information from the magnetic tape and places it on punched cards for billing. Vice President, Mr. Ray Crockett (above left) is shown outside the Redmond Office.



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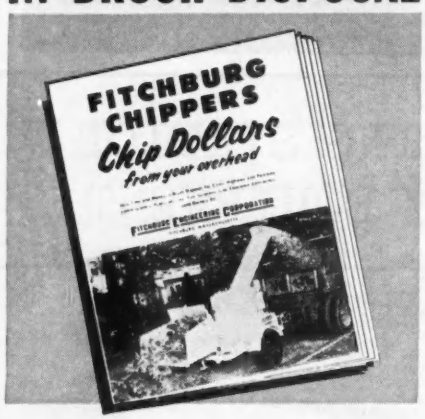

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Broader Service Horizons

(Continued from page 42)

general rule. For data transmission it is not economic to spend large amounts of money on high speed terminal equipment to transmit small amounts of information over any distance, or to transmit large volumes over short distances. There must be an economic balance between terminal costs and line costs — depending upon the volume of traffic and the distances involved. It is uneconomic to use a 10-ton truck just to carry a 1-pound package — likewise, it is uneconomic to use wideband facilities (such as video) to handle proportionately small volumes of data.

All of our studies of data transmission needs indicate that the basic voice band is the most suitable bandwidth. It can handle the required volumes most economically. Further, it permits the widest variety of terminal designs to balance, for a variety of needs, the economics of terminal-vs.-line costs.

Other important factors favoring the selection of voice band facilities for data transmission is their widespread availability and their flexibility. There are telephone lines under most of our streets, entering most of those places where data communications will be needed. All indications are that data communication needs of the future will be as diverse in geographic traffic pattern as present telephone service.

Just as people at scattered locations need to talk to each other, likewise data will need to be collected from and sent to scattered locations. Consider, for example, meter readers, or the grocery store ordering-inventory problem, or the banks, or the department store charging and credit checking needs, or the hauling-trucking industry. With some truckers, there is need for small amounts of data to be originated at as many locations as trucks may pick up or deliver — largely a local data transmission need. Likewise the truckers have a considerable long distance data transmission need. A typical trucking company may have 150 major terminals at locations scattered around the country.

Many situations like the foregoing lead us to the inevitable conclusion that the best way of handling data communications is over the regular local and long distance telephone facilities.

Business Machines

TO BETTER understand the engineering problems of transmitting data over regular telephone plant, it is first necessary to understand something about the machines which must "talk" over these facilities. Essentially, there are (1) data input devices, (2) data processing equipments, and (3) data output devices — often printers. As the chart (*Chart No.* 2) indicates, there are a wide variety of data input devices — manufactured by a number of business machine and office equipment companies. Each of these keyboard devices is capable of recording data in a "machine sensible" form — a form which can be sensed or "read" by a machine for the subsequent processing or transmission of this information.

The great variety of record media currently used for recording information in "machine sensible" form exists because of economics, because it is sometimes preferable to use one form of information storage and in other cases a different form. This variety also exists for a good old American reason — that is, keen competition between the business machine companies. This variety doesn't worry the average user too much, because, generally within his own organization, all of the equipment is produced by a single manufacturer, for example, by Burroughs, or Remington Rand, or IBM, or Friden, etc.

On chart (*Chart* No. 4) are shown some of the great variety of data processing equipments (viz., computers) which have been built to handle data. These computers can keep information in their memory for indefinite periods in a manner quite

comparable to the way filing cabinets and ledger books store information. These computers also manipulate or process information (add, subtract, multiply, divide, sort and merge) in a manner quite comparable to the way that people, working with adding machines or comptometers, process data.

To us communicators, the requirements imposed by business machines are somewhat comparable to our telephone users speaking a variety of different languages, English, French, German, Spanish, etc. Just as our circuits are capable of handling this variety of spoken languages, so are they capable of handling an equal variety of machine languages. Our job is to facilitate these machines talking to each other, each in its own language.

Engineering Problems

WHAT ARE the problems associated with facilitating these machines talking to each other? First, the information must be in electrical form (expressed as electrical bits). This is no problem for the business machine people and many of their equipments are already capable of expressing the output of a keyboard in electrical form. Many machines are capable of reading record media (tape, cards, etc.) and expressing the output as a series of electrical bits.

These electrical bits must then be conditioned for transmission over telephone circuits.

The business machine people feel, I think unanimously, that it is desirable for the Telephone Companies to accept these electrical bits, to "condition" them for transmission over our facilities, and to deliver bits at the receiving end exactly as they were fed to us at the sending end. A device which does this conditioning is termed a "Dataphone subset." It is, essentially, a modulator-demodulator — converting bits to tones at the sending end and vice versa at the receiving end.

The term "subset" is a contraction of the words subscriber set which we have used for many years to refer to the device which is installed on a subscriber's premises. We use the term with respect to Dataphone service because the Dataphone subset is likewise installed on the subscriber's premises, and further, because of the close similarity of the function which it performs to that of the regular telephone subset.

Just as the telephone subset ac-

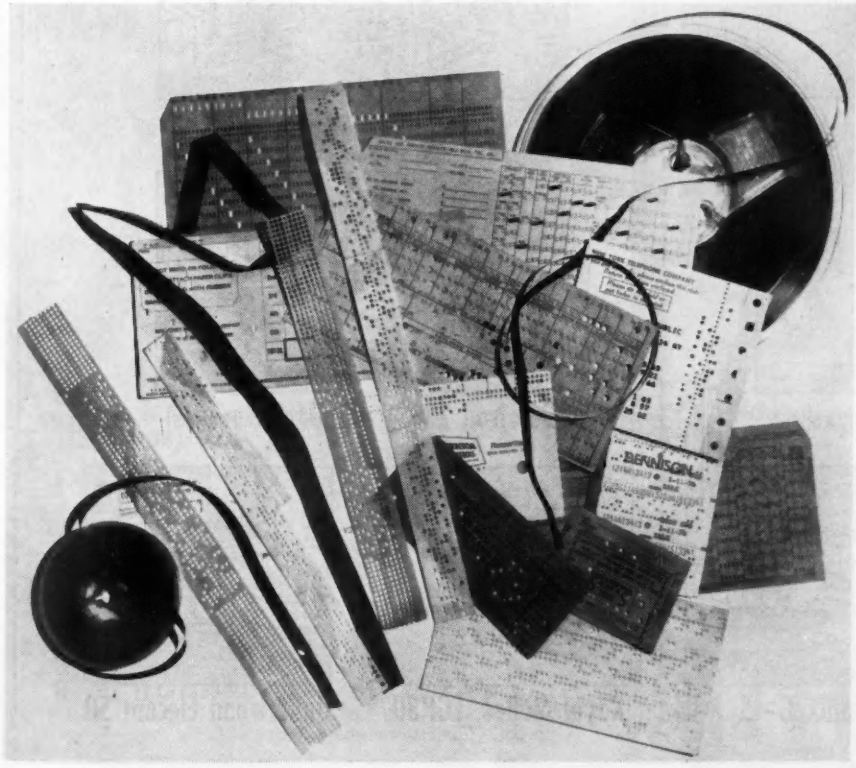

CHART THREE: — Some forms of record media.

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CT59-14

cepts acoustic information, conditions or converts it to suitable form for transmission over our circuits, and converts it back to its original form at the receiving end, so likewise does the Dataphone subset accept digital information (in the form of electrical bits) and convert it into a suitable form (tones) for transmission over telephone circuits and then convert it back to its original form at the receiving end.

Another reason why it is preferable for the Telephone Companies to provide a suitable data subset is that the subset will not only perform a useful and necessary function, but it can also protect our plant and our other services from excessive voltage, from crosstalk, etc. Further, it will insure coordination with the tone equipment used in central offices for switching control, for supervision, and for automatic message accounting.

Just as we have several types of telephone subsets (wall sets, keysets, etc.) there will unquestionably need to be several types of Dataphone subsets to meet the varied situations and varieties of speed, volume, levels of coding, etc. Whereas a particular subset may be most economic for handling small volumes of data which are being transmitted over short distances, another more sophisticated subset will be unquestionably preferable for handling higher volumes over longer distances.

Another engineering factor of significance is the relationship between the speed capability of business machine equipment and the corresponding bit-rate capability of telephone channels. For example, most data originating devices are keyboard operated and deliver output information at a rate of about 50 to 100 bits per second. This is comparable to teletypewriter speeds. However, the input to most computers is at the rate of about 100,000 bits per second, or higher. Therefore, because the telephone line has a speed capability which is intermediate — between that of many low-speed human-operated devices and that of the input-outputs of electronic computers, it is often desirable to match the speed capability of the terminal to that of the line.

The least expensive and most widely used existing data-input business machines (card punches, cash registers, etc.) are electromechanical in nature; these deliver an output at about 50-75 bits per second. The "recorded carrier" Dataphone subset was designed to accept inputs from such equipment, to store the information until a suitable quantity has been accumulated, and then to transmit it over the telephone circuit at the maximum speed capability of the telephone line. This matching of speeds, to make efficient use of the telephone line, becomes more important at the lower distances.

However, the availability of relatively high-speed telephone lines (as compared with the slower-speed telegraph channels) has an effect on the development of new business machine devices. Already, we observe definite increases in the speed capability of new designs of card and paper tape reading-punching equipments, thus

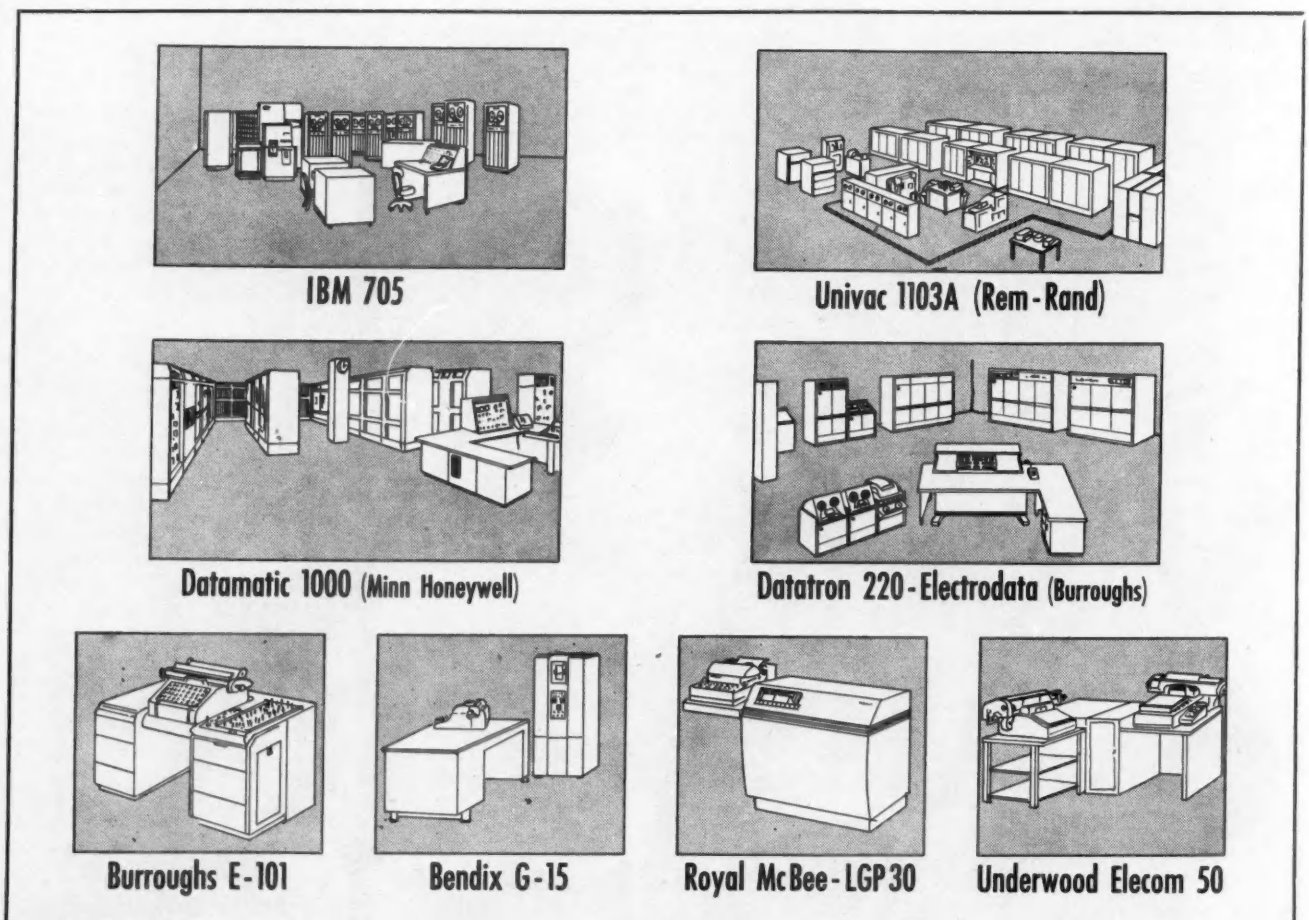

CHART FOUR: — Data processing machines.

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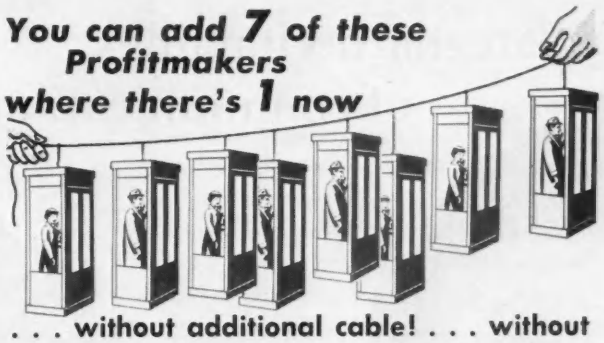

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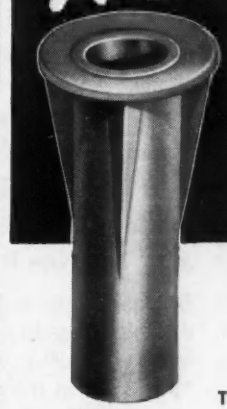

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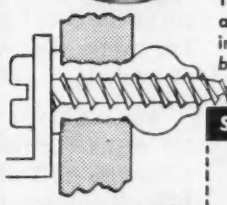

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bringing them closer to the point where they can make optimum use of telephones lines without an intermediate buffering "speed change" device.

At the other end of the speed spectrum, both the input-outputs of computers and the normal operating speeds of associated magnetic tape units, are considerably higher than the bit rate capability of telephone circuits. Even if we are able to design sophisticated Dataphone subsets which permit the transmission of as high as 2,000 bits per second over a voice-band facility, this is still very slow compared to computer speeds. A typical computer tape unit operates at about 50,000 bits per second. The internal operating speed of computers is, of course, much higher than this, but we need only concern ourselves with input-output speeds.

When computer designers, sometimes not experienced in communications, first begin to think about the communications aspects of an overall data system, often they initially think that they would like to use very high speed (video) facilities between all locations. Of course, as they analyze the economics, they realize that this would be impracticable. For one thing, data originating devices are essentially slow speed. Buffering (temporary storage) is the answer — and it is most economic to provide this on a centralized basis.

Further, centralized controlling, scheduling and programming of the loads that are applied to computers is often desirable. For such systems, batch transmissions are most economic to employ moderate speed data transmission with buffering at the computer input-output.

In instances where the volume of data to be transmitted within a given time interval exceeds the capability of a voice line, several voice lines may be used simultaneously. For example, the end-of-week or end-of-month accounting balances may involve large volumes which must be transmitted in a brief time interval. Dividing the load into several batches and using several "dialed-up" telephone circuits simultaneously, will provide the required traffic capacity.

(To Be Continued)

COURTS and COMMISSIONS

by JOHN G. REYNOLDS

California PUC Takes Stand On Taxes

California commission urges utilities taking fast tax write-offs to pass the savings on to their customers . . . New York adopts new policy on cost accounting by utilities . . . Delaware PSC slashes rate request.

California PUC Staff Tells Stand On Taxes

- **Commission urges utilities taking fast tax write-offs to pass savings on to customers.**

CALIFORNIA public utilities taking fast tax write-offs have been urged by the staff of the State Public Utilities Commission to pass the savings on to their customers.

The statement of position by the PUC staff was the first since last September. Presiding Commissioner Ray E. Untereiner originally had ruled that the staff could not express an opinion, holding that it could not have had enough facts on which to base an opinion.

The staff's views were given by Stewart Weber, PUC supervising utilities engineer, who appeared as a witness as the commission considered a proposal by some public utilities in the state that they be allowed to keep money saved from fast tax write-offs. The utilities want the commission to ignore these savings, which may amount to many millions of dollars, when setting rates.

The savings would result from a recent federal law allowing utilities to depreciate the value of assets more rapidly by means of an accounting device called tax normalization.

Asserting that rates should be based on actual tax costs and not upon speculative future costs, Weber said utilities would use the savings to buy new equipment on which still more fast depreciation tax deductions could be claimed in a never-ending process.

The utilities argue that their income taxes in future years will be all the higher if they use up deductions from fast depreciation at present. They contend the write-offs are not really tax savings but are, in fact, tax deferrals.

The state attorney general's office and many cities throughout California also have opposed the utilities' request.

New York PSC Adopts Rules On Accounting

- **In some cases new rules will weaken arguments for rate increases.**

NEW YORK'S Public Service Commission has announced a new policy on cost accounting by utilities that will weaken their arguments for rate increases in some instances.

Adopted unanimously by the commission's five members, the policy declaration affects electric, gas, steam, telephone, water and bus companies throughout the state. In simple terms, it requires that:

(1)—Any savings that utilities realize for federal tax purposes, under certain provisions of the internal revenue code, must also be considered as savings for rate-making purposes before the commission.

(2)—Any utilities that are eligible for this type of federal tax saving should take advantage of the law and pass the saving along to their consumers in lower rates or improved service.

Originally enacted to encourage utilities to undertake capital expansion beneficial to the defense effort, the federal tax laws, generally speaking, permit utilities to pay lower taxes during the first few years that a new facility is in operation, by permitting them to depreciate the value of a facility and amortize its cost more rapidly in the early years of its existence and more slowly later.

One provision of the code authorizes an accelerated depreciation system for almost any kind of facility built after 1954. This accelerated system may be used instead of the normal "straight line" method, under which a set amount of the facility's value is written off every year throughout its life.

Some utilities that have taken advantage of the accelerated depreciation system have maintained that the resulting tax savings are not really savings, but "deferred taxes" that will have to be paid when the depreciation rate is slowed down.

The commission's ruling rejected this position, saying, in effect, that because utilities were operating in a steadily expanding economy, they were realizing these tax savings steadily as they expanded their plants and should be required to account for them to their customers.

The net effect of the commission's ruling is that utilities seeking rate increases will be able to charge as expenses only the actual taxes they pay to the federal government, not what they would have paid if they had not taken advantage of the special code provisions.

The commission's decision provides that all such tax savings must be deposited in a reverse account and the funds may be used for capital expansion purposes but not for dividends. Any excess must be channeled back annually to help pay the next year's tax bills.

The utility indicated it may charge any utility seeking a rate increase that has failed to take advantage of federal tax saving opportunities the amount it might have saved and adjust its rate schedule accordingly.

Delaware PSC Rules On Telephone Rates

- **Commission slashes Diamond State Tel. Co. rate increase request.**

DELAWARE'S Public Service Commission has granted the Diamond

State Telephone Co. a rate increase that will permit the firm to earn an extra $886,530 a year, $1,501,870 less than the $2,388,400 the company expected to gain annually by the requested rate boost.

The company will have to refund a large part of rate increases put into effect on a tentative basis last Sept. 15. Those rates would have remained in effect if the PSC had approved the full rate increase requested by Diamond State.

Commission Chairman Norman B. Baylis said the decision would produce $400,216 in added annual revenue after taxes for the telephone company.

The commission held that the valuation of the firm's property should be $40 million. The company had requested a rate base of $44,533,834, which it said was the reproduction cost of its property. The commission's figure is $5 million higher than the rate base in the last telephone case.

The firm had asked for a 6.9% rate of return, but early in the case entered into a stipulation with the commission fixing the rate at 6.19%, the same rate used in the preceding telephone case. The PSC contended that there had been no appreciable change in the money market to justify a higher rate of return.

Phone Rate Increase Approved In Florida

- **New General Tel. rates will produce $1,620,495 in additional gross revenues.**

FLORIDA'S State Railroad and Public Utilities Commission, in a split decision, granted the General Telephone Co. of Florida permission to increase its rates to bring in $1,620,495 in additional annual gross revenue. The firm, which operates in Tampa, St. Petersburg and other areas around Tampa Bay, had asked a rate hike of $4 million a year.

Commissioners Alan Boyd and Wilbur King voted for the increase. Chairman Jerry Carter contended, however, that the policies and operations of the company and the case it presented did not justify the increase.

The company had requested the higher rates on the ground it had to have a greater return on its investment to attract capital for a proposed $25 million expansion program.

Of the $1,620,495 granted by the commission majority, the company will net only about $765,457. The remainder will go to pay federal and state taxes.

Phone Rate Increases Voided In New Mexico

- **Court rules against commission suspension of rate increases in eight Mountain Tel. exchanges.**

NEW MEXICO's Supreme Court has unanimously ruled invalid the State Corporation Commission's suspension of telephone rate increases in eight communities last fall. The high state tribunal's opinion held that a hearing conducted by the commission last Sept. 2 was not actually a proper hearing as required by the state constitution. The case had been taken to the Supreme Court by Mountain States Telephone Co. immediately after the commission's proceedings.

Rate boosts of about $227,000 are involved in Alamogordo, Cloudcroft, Tularosa, Farmington, Aztec, Las Cruces, La Mesa and Grants-Anaconda Mill.

Commission Chairman Ingram B. Pickett would not comment on whether a re-hearing would be sought. The telephone company could have put the rate boosts into effect under bond, but chose instead to remove the case to the high court, with the commission agreeing to the test.

Montana Ruling Upholds Reimbursement Measure

- **District Court Judge upholds state law providing for use of highway funds to reimburse utilities.**

IN AN OPINION expected to be appealed to the Montana Supreme Court, the constitutionality of a state law providing for the use of highway funds to reimburse public utilities for 75% of their costs of relocating facilities when necessitated by new highway construction was upheld by District Court Judge Sid G. Stewart in Helena.

Directly affected are 33 utility companies and rural electric and telephone cooperatives that entered the case as intervenors. Thus far the State Highway Commission has not paid any utility claim for relocation charges under the reimbursement law, enacted in 1957.

Although noting there was much legal support for the contention of the plaintiff, V. L. Jones, that utilities using highway rights of way could be considered as mere guests of the state, Judge Stewart concluded that "a very definite change" took place when Congress in 1956 enacted the law creating the interstate highway system of 41,000 miles and providing for its rapid completion.

"As a result of this tremendous project," Stewart said, "Congress recognized that instead of the normal anticipated relocations of the utilities upon the state-owned rights of way, now a situation of emergency existed in that instead of a few miles of relocation each year, the utilities would now be required to make thousands of miles of relocations within a short period of time and that few, if any, could withstand this financial burden placed upon them."

Maryland Phone Rate Boost Being Sought

- **C. & P. Tel. Co. asks PSC to set new valuation on company's assets and establish a fair return.**

MARYLAND's Public Service Commission has been asked to approve a rate boost, the second in little more than a year, for the Chesapeake & Potomac Telephone Co. of Maryland. The firm's petition asked the commission to set a new valuation on the company's assets and to set a fair return.

The petition came on the heels of a demand by People's Counsel Wilfred T. McQuaid before the commission that the telephone company return some $6 million he said it had made in excess of its authorized income in 1958.

McQuaid argued that the company should refund this sum because it was based "unlawfully" on a higher rate of return than allowed by a commission decision handed down in February, 1958.

W. Griffin Morrel, company vice president, denied McQuaid's allegation.

DIRECTORS AND OFFICERS, Iowa Independent Telephone Association, 1959-1960. Left to right, top row: KENNETH A. YOUNG, Fort Dodge; E. B. ZERWAS, Manning; C. C. PEARCE, Riceville; ARTHUR E. LONG, Sloan; EDWARD G. CARLSON, Creston; ROY E. BRANDEL, Mount Pleasant; HARRY MILLER, Great Bend, Kansas; ROSS K. VERNON, Sioux Center; V. D. PECK, Primghar; WILLIAM F. MILLER, Des Moines, (secretary-treasurer). Bottom (l. to r.): H. MELICK, West Liberty; EARLE G. BELLAMY, Knoxville; JOSEPH L. VAN HORN, Grinnell; JOHN J. McINTOSH, Cedar Rapids, (president); HAROLD THOMPSON, Clear Lake, (first vice-president); A. W. SANDERS, New London (second vice-president); HENRY B. MELICK, West Liberty; CLYDE McFARLIN, Montezuma.

industry NEWS briefs

West Virginia's 500,000th Telephone Installed

ON MARCH 23, West Virginia's 500,000th telephone was installed in the home of Mr. and Mrs. Joseph Paugh at New Haven, W. Va., and on March 25 Robert W. Ingle, president of the West Virginia Telephone Association, Leroy N. Darling, association secretary, C. H. Johnson, vice president, The Chesapeake & Potomac Telephone Co. of West Virginia, and Donald Roush, president, The Home Telephone Co., presented Governor Cecil H. Underwood with an inscribed telephone symbolic of this milestone in W. Va.'s telephone history.

In presenting the handsome brown 6-button telephone with the words "this telephone is symbolic of West Virginia's 500,000th telephone installed in New Haven, W. Va., March 23, 1959" inscribed on a gold plaque on the front of the telephone to Governor Underwood, Robert W. Ingle, on behalf of the fifty telephone companies comprising the West Virginia Telephone Association, said, "This telephone is a symbol not only of West Virginia's half millionth telephone, but is a symbol of the progress and continued growth of West Virginia itself. We in the telephone industry are proud to have had a part in helping — and serving — this progress."

United Tel. Announces Four Promotions

GEORGE A. HEARNE, vice president and general manager for the United Telephone Companies of Arkansas, Kansas, and Missouri, subsidiaries of United Utilities, Inc. of Abilene, Kansas, recently announced four management promotions and transfers.

Elvin Durr, building and central office equipment engineer, has been promoted to the newly created position of chief engineer for the three companies. Durr has been with the United System for 31 years. He was

Present at presentation of telephone symbolic of West Virginia's 500,000th telephone are (l. to r.): LeROY N. DARLING, secretary, West Virginia Telephone Association; Governor CECIL H. UNDERWOOD; C. H. JOHNSON, vice president, Chesapeake & Potomac Telephone Co. of West Virginia; R. W. INGLE, president, West Virginia Telephone Association; and DONALD A. ROUSH, president, Home Telephone Co.

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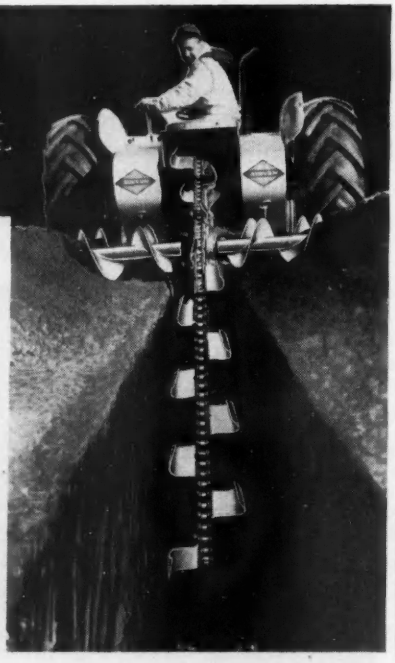

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graduated from Pittsburg State Teachers' College, Pittsburg, Kans., in 1926 with a degree in Electrical Engineering. His first position with the United System was as local manager at Fairfax, Mo., in 1928. Other positions held by Durr have included

ELVIN DURR

area manager at Hopkins, Mo., district manager at Mound City and Clinton, Mo., and division plant superintendent at Clinton, Mo.

Durr was transferred to Kansas City in 1956 as buildings and central office equipment engineer, which position he has held until his recent promotion.

John Herdt, Jr. has been named plant superintendent for the three companies. Herdt was first employed by the United Companies at Russell, Kans. in 1943 as a lineman. In 1944,

JOHN HERDT, JR.

he joined the Merchant Marines where he served for the duration of World War II. After the War, he returned to Russell where he served as a troubleman until 1953 when he was promoted to the position of equipment supervisor. In 1956, he was transferred to Kansas City and promoted to the position of assistant plant engineer, and was later promoted to plant engineer, the position which he has held until his recent promotion to plant superintendent.

Fred Thorn, formerly purchasing agent and assistant engineer, has been named to the newly created position of transmission engineer for the engineering department of the Companies. He began his telephone career in 1926 at Burlingame, Kans. He advanced through various plant positions and was named equipment supervisor at Rolla, Mo., in 1955. He was promoted to the position of purchasing agent and assistant engineer in 1957.

Glen Tuck joins the plant department staff as purchasing agent succeeding Thorn. His telephone career began in 1948 at Holton, Kans. After serving with the Signal Corps from 1951 to 1953 during the Korean War, he returned to plant positions in Kansas, later becoming a combination plant man at Baldwin, Kans., in 1956.

Texas Independents Hold Annual Convention

A COMBINATION of old practices plus new convention ideas made the 1959 convention of the Texas Telephone Association a great success with a large attendance and an enthusiastic audience for each part of the program.

The convention was held at the Hilton Hotel in San Antonio where the new facilities of the Hilton's Grand Ball Room were used for the manufacturers' and suppliers' exhibits and part of the convention program.

The convention theme was based on the opportunities for merchandising of equipment in connection with the telephone operations. Probably as a result of the spectaculars on TV the Texas Independents decided that something of this kind should be done.

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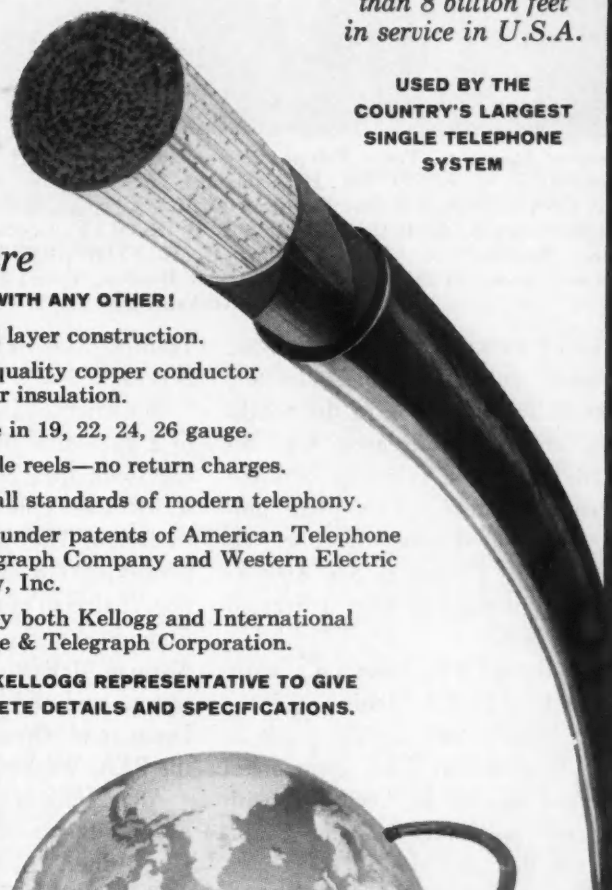

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For complete list of offices, see pages 6-7.

Board of Directors, Texas Telephone Association seated (l. to r.): DEE COLE, Greenville; CHARLES A. HENDRIX, Brazoria; D. G. GARDNER, JR., Nocona; J. B. HALEY, Austin; W. G. WINTERS, Houston; GUY SMELSER, Bogata; J. T. CHAMBERS, Tenaha; Standing (l. to r.): E. H. DANNER, San Angelo; R. A. GOODSON, Dallas; W. S. BAIN, San Antonio; A. L. ROBB, Electra; J. B. McDUFF, Crockett; H. Y. PRICE, JR., San Marcos; MORRIS S. BURTON, Tyler; MARION A. CLAY, Lufkin; D. H. COMPARETTE, JR., Kerrville; C. G. MENDENHALL, Anahuac. Directors not shown in this picture are: Oscar Burton, Tyler; Cliff Dowd, Hawkins; Fabian Bearden, Baird; Claud Gilmer, Rocksprings; D. T. Strickland, Brownwood.

relations director, and Joe Collyns, assistant public relations director, General Telephone Co. of the Southwest, an entire afternoon was devoted to "Texas Telerama and the Newness Thereof." This stage production featured some attractive girls from Trinity College in San Antonio who had previously been rehearsed for the part.

The Burnet Telephone Co., represented by James L. Luther and the Kelley family, took the plant side in sales stimulation. The commercial side was handled by Cecil Cale with very able assistants from the Southwestern Bell, and the traffic responsibility was illustrated by Bill Nichols and traffic department assistants of the General Telephone Co. of the Southwest.

The grand finale consisted of the unit augmented by Dick Post of the Southwestern States, Mark Cooper and Joe Collyns of General Telephone Co., and the girls wearing costumes made in the form of handsets, pay-stations, etc.

The general sessions of the convention were highlighted by excellent papers by Hugh A. Barnhart, president of the USITA, Rochester, Ind.; E. M. Clark, president of the Southwestern Bell Telephone Co., St. Louis; R. C. "Pete" Reno, vice president and editor of *Telephony;* F. E. Morris, director, Telecommunication Research, Stromberg-Carlson; and Lt. Col. Vincent I. Hack, MSC, Chief, Training Aids Branch, Army Medical Service School, Fort Sam Houston.

One afternoon session was devoted to a discussion by the REA Borrowers' Committee of the Association of which Dee Cole of Greenville was chairman. The question and answer period was conducted by W. G. Winters, chairman of the REA Borrowers' Committee of the USITA, assisted by Norman McFarlin, assistant administrator, and Ed Maddox, chief of Loans and Operations Division of the REA, Washington, D. C.

All general sessions were presided over by the association president, D. G. Gardner, Jr., of Nocona.

The luncheon sponsored by the Texas Chapter of the Independent Telephone Pioneers featured the Acapella choir of the Trinity College of San Antonio. Mrs. Winnie Burnett of Southwestern States Telephone Co., Brownwood, was elected president of the group.

The following directors of the Texas Telephone Association were re-elected: W. S. Bain, pres., Mid-State Tel. Co., San Antonio; Oscar Burton, vice pres., Gulf States Tel. Co., Tyler; Marion A. Clay, gen. mgr., Lufkin Tel. Exchange, Lufkin; E. H. Danner, pres., General Tel. Co. of the Southwest, San Angelo; D. G. Gardner, Jr., vice pres., Nocona Tel. Co., Nocona; R. A. Goodson, vice pres. & gen. mgr., Southwestern Bell Telephone Co., Dallas; and W. G. Winters, pres., Texas Tel. & Tel. Co., Houston.

The following officers were re-elected: D. G. Gardner, Jr., president; Marion A. Clay, 1st vice pres.; W. S. Bain, 2nd vice pres.; Pam D. Grimstead, treasurer; and J. B. Haley, executive secretary.

D. E. LaMaster Joins General Tel. of Florida

D. E. LaMASTER has been appointed marketing and sales manager for General Telephone Co. of Florida, it was announced last month by Donald C. Power, chairman and chief executive officer of General Telephone & Electronics Corp., New York City. LaMaster will make his headquarters in Tampa, Florida.

LaMaster was marketing and merchandising administrator with the General Telephone Service Corp. in New York City. He joined General Telephone in 1937 and has had experience in the Directory companies as well as subsidiary operating telephone companies.

Former USITA President, J. R. Porter, Dies

JOHN RUCKER PORTER, 78, honorary chairman of the board and former president of Carolina Telephone & Telegraph Co., Tarboro, N. C., died March 28. He had suffered a stroke and had been hospitalized.

Mr. Porter began his telephone career with Cumberland Telephone & Telegraph Co. (now a part of South-

ern Bell) and served in various capacities with that company until 1918.

In 1918 he joined Home Telephone & Telegraph Co. of North Carolina, with headquarters at Henderson. He served as general manager of that company until the merger in 1926 of the Home Telephone & Telegraph Co. and the Carolina Telephone & Telegraph Co., when he became executive vice president of the combined companies which retained the name of Carolina Telephone & Telegraph Co.

Mr. Porter became president of the Carolina company in 1938, a position he held until 1945, when he was elected chairman of the board of directors. Although he retired from active service in 1947, he continued as chairman of the board of directors until May, 1957, when he was elected honorary chairman of the board.

He also served as executive vice president, president, chairman of the board and honorary chairman of the board of the Home Telephone & Telegraph Co. of Virginia.

He was active in the formation and served as director for many years of the North Carolina Independent Telephone Association, and served as a member of the board of directors of the United States Independent Telephone Association, and one term as president of that organization.

Surviving are: one daughter, Miss Elizabeth Porter; one son, Knox D.; three sisters, Mrs. Ella Mae Woods; Mrs. Hattie P. Jackson, and Miss Melville Porter; and one grandson.

Mrs. Winnie Burnett Heads Texas Pioneers

THE TEXAS Chapter of the Independent Telephone Pioneer Association has elected the first woman president of a Pioneer group.

Mrs. Winnie B. Burnett, traveling chief operator for The Southwestern States Telephone Co., Brownwood, Texas, is the new president of the Texas Pioneers. She was elected at the annual Texas Telephone Association convention in San Antonio in March.

Mrs. Burnett succeeds C. G. Mac-

MRS. WINNIE BURNETT

Lelland of Universal Controls Corp., Dallas.

Other officers elected include First Vice President, Dee Cole, Quinlan Telephone Co., Greenville; Secretary-Treasurer, Era Lowery, The Southwestern States Telephone Co., Brownwood; and Vice Presidents — J. L. Kemper, General Telephone Co. of the Southwest, Brownfield; Morris Bateman, Conroe Telephone Co., Conroe; and W. E. Lyon, Mid-Texas Telephone Co., Killeen.

Wanerus Transfers to Gen. Tel. Service Corp.

RALPH T. WANERUS, former division equipment maintenance supervisor for General Telephone Co. of Calif., has been named equipment administrator of General Telephone Service Corp., New York City.

Wanerus joined the California company in 1929 as a switchman in the Long Beach exchange. During his employment, he has had considerable experience in equipment supervision and equipment engineering. In his new assignment, Wanerus will report to Paul Malmgren, plant director.

Rochester Telephone Corp. Listed on New York Exchange

THE ROCHESTER Telephone Corporation, which provides telephone service only in the Rochester, N. Y. area but is owned by more than 10,000 stockholders throughout the 49 states, the District of Columbia, and three foreign countries, was listed on the New York Stock Exchange last month. The ticker symbol is "RTC."

The only unaffiliated telephone company listed on the Exchange, the corporation supplies telephone service in Rochester and all or part of six surrounding counties — Monroe, Livingston, Genesee, Ontario, Steuben, and Wyoming — an area of 2,300 square miles with a population estimated at 650,000.

Founded in 1921, the firm is the nation's largest unaffiliated telephone company, according to Donald H. Campbell, president. Dividends have been paid every year since the company's inception.

Rochester Telephone Corp. grossed net earnings in 1958 of $2,248,057, an increase of more than $186,000 from the previous year. Earnings per share were $1.49 and book value per share was $18.32, both up from 1957.

Admitted to trading on the Exchange March 30 were 1,367,186 shares of $10 par value. Common shares outstanding number 1,171,874 and are held by 10,325 stockholders, according to the company.

Rochester Telephone Corp. report-construction expenditure last year totaled $10,640,804 and is expected to reach $12 million during 1959. Seventy million dollars has been spent for modernization during the past 10 years and $51 million more will be spent in the next five-year period.

Phalen Succeeds McHugh As New York Tel. Pres.

DIRECTORS of the New York Telephone Co. have elected Clifton W. Phalen president, effective May 1, succeeding Keith S. McHugh, who has accepted appointment by Governor Nelson A. Rockefeller as New York State Commissioner of Commerce starting on that date.

In anticipation of taking up his new post, McHugh, who has completed 40 years of telephone service, tendered his resignation as president, director, and member of the executive committee of the New York company, to be effective on April 30.

Phalen, who will succeed McHugh

also as a director and member of the executive committee of New York Tel., has been an executive vice president of the American Telephone & Telegraph Co. since March, 1956. He began telephone work with the New York Telephone Co. in 1928 in the plant department in Syracuse, and served in positions of increasing responsibility until his election as a vice president of that company in 1944. He became a vice president of A T & T in 1948, and from 1952 to 1956 was president of the Michigan Bell Telephone Co. He is a graduate of Yale University and lives in Plandome, N. Y.

McHugh has been president of the New York Telephone Co. nearly 10 years. He began his Bell System career 40 years ago as a clerk with the A T & T Co. He was made general commercial manager of the upstate area of the New York Telephone Co. in 1925, and was elected public relations vice president of the company when he was 34 years old. For 20 years beginning in 1929 he held executive positions at A T & T including vice presidential responsibilities in administration, public relations, and finance.

What is probably Independent telephony's longest direct distance dialed telephone call was recently placed by Ellensburg Telephone Co. in Wash. to Orange County Telephone Co. of Middletown, N. Y. In the "split-screen" photo (l. to r.), R. E. RUDOLPH, Ellensburg company president, Ellensburg Mayor CHARLES KELSO and LEONARD THAYER, Chamber of Commerce president, discuss the transcontinental service with Mayor RAYMOND E. SYALM of Middletown ROSCOE F. GILES, of the Middletown Chamber of Commerce and CHARLES C. CHAPPELL, Orange County president.

Orange County Telephone Honors Retiring Employes

TEN EMPLOYES of the Orange County Telephone Co., Middletown, N. Y., were honored at a recent testimonial dinner, marking their retirement from the firm. One hundred and eleven co-workers were present to pay tribute to the honored guests, whose service ranged from 19 years to 55 years, or a total of 420 years.

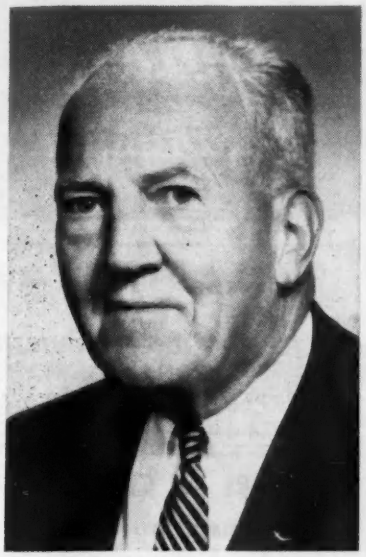
ORANGE COUNTY TEL. CO., Middletown, N. Y., recently honored 10 retiring employes. Shown above are: (seated l. to r.) LESTER W. KING, AGNES V. ROWELL, JULIA M. DIEHL, and EDWARD R. DAVENPORT. Standing (l. to r.) are: FRANK A. CAREY; FRANK D. FANCHER, vice president and general manager; MAHLON H. TYRELL; CHARLES C. CHAPPELL, president, and CHARLES G. ROESCHER. Alvin Budd, Harry Terwilliger, and Fred Yaeger were unable to be present because of illness.

Honored were: Miss Agnes V. Rowell, general auditor, with 55 years of service; Edward R. Davenport, equipment manager, 52 years; Miss Julia M. Diehl, general traffic supervisor, 50 years; Mahlon H. Tyrell, custodian of plant records, 46 years; Frank A. Carey, installer-trouble-shooter, 40 years; Lester W. King, CDO maintenance, 40 years, and Charles G. Roescher, building custodian, 19 years.

Three of the 10 honored guests were unable to attend the dinner party because of illness. They were: Fred R. Yaeger, purchasing agent, with 47 years of service; Harry R. Terwilliger, plant superintendent, 36 years of service, and Alvin G. Budd, cable splicer, 35 years.

Carolina T & T Names Lewis, Assistant Auditor

GEORGE W. LEWIS has been made assistant auditor of the Carolina Telephone & Telegraph Co., Tarboro, N. C. Lewis began his telephone career in May, 1951, when he joined the company as a junior accountant.



K. M. KLINE (left), manager, telephone sales, Line Material Industries, has retired after 41 years of service and A. W. HERMAN (right) has assumed the telephone sales duties.

Anaconda Purchases Sequoia Wire & Cable Co.

ANACONDA Wire & Cable Company has entered into an agreement to purchase 100% of the stock of Sequoia Wire & Cable Company, Redwood City, Calif., from Mandrel Industries, Incorporated. It will operate the company as a wholly-owned subsidiary for the manufacture of small wires for use in aircraft, missiles and electronic controls. Mandrel Industries will continue as a manufacturer of electronic instruments and custom assemblies at its Burbank, Calif. plant.

The purchase of Sequoia enables Anaconda to add missile and electronic control insulated wires and cables to its line of other wire and cable products and accessories.

Sequoia is a supplier of special wires and cables for the growing missile and electronic controls industries.

Final arrangements for the stock purchase are now under way and the closing date will be announced soon.

New Sales Representative For Automatic Electric

JOHN P. COSTELLO has recently been named a sales representative for a newly created territory in the industrial products division of Automatic Electric Sales Corporation.

The new territory will cover the Washington, D. C. area made up of the District of Columbia, Virginia and parts of West Virginia and Maryland. His headquarters are in Alexandria, Virginia.

Formerly staff assistant in the corporation's government sales division, Costello joined Automatic Electric Sales in 1955 as a sales correspondent. He attended Loras College in Dubuque, Iowa.

Stromberg-Carlson Names Industrial Sales Reps.

ROBERT E. CLELAND has been named Telecommunication Industrial Sales Representative for General Dynamics Corporation's Stromberg-Carlson Division in the Southwest Zone.

In his new position Cleland will be responsible for the sale of telecommunication equipment to major industrial and commercial establishments in Alabama, Arkansas, Colorado, Kansas, Louisiana, Mississippi, New Mexico, Oklahoma, Tennessee and Texas. He is a native of Muskogee, Oklahoma.

Cleland has been an active worker in communications for more than 19 years, having joined Stromberg-Carlson in 1940 as an installer of dial switching equipment in telephone central offices. In 1947 he was appointed an installation foreman, and in 1951 joined the Rochester Branch of the Telecommunication Division. For the past several years he has been stationed in Mt. Vernon, Ohio.

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POLES, Southern Yellow Pine — *Texas Creosoting Co., Orange, Texas.*

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FOR SALE — 1—W. E. 100 line switchboard with practically new A. E. keys. 700—W. E. magneto telephones complete. Huntingdon & Centre County Tel. Co., Warriors Mark, Pa.

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STROMBERG-CARLSON Relay Dial Switchboard, equipped with 85 regular lines; 14 paystation lines with tone and battery reversal; 2 PBX rotary lines; 18 links; 18 trunks two ways; 200 pr. MDF; 2 Leich, 5 frequency harmonic converters; and all inter-cabinet cabling. New, August 1946; retired from service, excellent condition, November 1957. Any reasonable offer considered for quick disposal. Write Box 61, c/o TE&M.

MAGNETO TELEPHONES — Leich 901 wall or desk magneto telephones. Cleaned, tested and guaranteed, $16.50 each. As removed from service, $15.00 each. Turtle Lake Tel. Co., Turtle Lake, Wisc.

SOLICITATION OF PROPOSALS FOR THE PURCHASE OF THE VIRGIN ISLANDS TELEPHONE SYSTEM. Sealed proposals for the purchase, rebuilding, expansion, and subsequent operation of the telephone system now owned and operated by the Government of the Virgin Islands will be received until 2:00 p.m., E.S.T. on June 12, 1959, at Room 6514, Department of the Interior, Washington 25, D. C. The sealed envelope containing the proposal shall be clearly marked and bear the notation "Proposal for Purchase of the Virgin Island Telephone System."

Proposals are solicited by the Government of the Virgin Islands pursuant to Act. No. 317 of the 2nd Legislature of the Virgin Islands, approved June 19, 1958.

A SOLICITATION OF PROPOSALS FOR THE PURCHASE OF THE VIRGIN ISLANDS GOVERNMENT TELEPHONE SYSTEM may be obtained by writing or calling at the Office of Territories, Department of the Interior, Washington 25, D. C. SECTION IV OF THE SOLICITATION, CONTENTS OF PROPOSAL, includes minimum requirements that must be included in proposals submitted.

HANDSETS AND PARTS

TRANSMITTERS

Stromberg-Carlson #210279-000(#29) NEW for 1500 Series
Western Electric #T-1 NEW for 500 Series
Western Electric #F-1 NEW for 302 Series

RECEIVER

Western Electric #U-1 NEW for 500 Series

HANDSET

Western Electric G-1AW3 NEW complete with T-1 and U-1 capsules and neoprene cord for 500 Series

TELEPHONE

Western Electric #302 complete with Dial and Synchromonic Ringers 16, 30, 42, 54 and 66 cycle Ringers. (As removed from service or recommended)

SAVE 40% OR MORE
MINIMUM ORDER ON PARTS 10 OR MORE

BUCKEYE TELEPHONE & SUPPLY CO.

1250 Kinnear Rd. HU 8-0655 Columbus 21, Ohio

CORRECTION

60AP Selectors, complete with 162C Selector Set, new $35.00
60AP Selectors only new $25.00
—(sorry, no 162C separately)—
—our error—

Telegraph Carrier Terminals
W.E. 6-12 channel

Composite Sets

Complete systems & parts

Power supplies—cabinets—racks

C CARRIER-WEST TERM
H Carrier & Filters (C & H types)
Speech-plus Duplex carrier

TG 30-31 Telegraph Repeaters $50.

CF-3A Telegraph Carrier Repeaters $100.

Relays—condensers—plugs—cords —keys—jacks & mountings, etc.

priced to sell NOW
—Shipped on approval—

Telectric Co.
1218 VENICE BOULEVARD
LOS ANGELES 6, CALIFORNIA

REPEATERS, VF (new)
Dry line—22 type
TP 14 (portable) 2-4 wire
115-240 VAC—12 VDC
12-18 DB gain (resp.)
—intermediate or end-
Ring by-passed—
mfg by Federal .....New $150.

3-CIRCUIT W.E. (new)
OA-8/FC (X61821-k-l)
115-230 VAC
2 or 4 wire (24-30 DB gain)
7 ft. 19" cabinet (steel) with telegraph composite sets and balancing network, protectors, drainage coils, test jacks, etc .....$300.

VF RINGER
(1000—20 cycle) EE 101A
115-230 VAC ((2 circuits) W.E.
New .....$100.
record. ..... 65.
2 EE 101 in steel cabinet with 7.5 watt Subcycle
TA 38/FC (W.E.) new .....$200.

VF RINGER—115-230 VAC
single circuit
TA 3/FT Federal, new .....$35.

Manual (illustrated) included
— loaned for inspection —
for all above items

CABLE—IN STOCK

Immediate Delivery!—Any Length From 50 Ft. up to FULL LENGTH REELS—All Sizes & Gauges Available!!

RURAL & URBAN DISTRIBUTION CABLE:
19 Ga.—22 Ga.—24 Ga.
2, 3, 4, 6, 11, 12, and 16 Pairs.

AERIAL & DUCT PLASTIC JACKETED CABLE

Red & Clear—REA Spec. PE-14:
26 Gauge—51 and 202 Pairs.
24 Gauge—16, 26, 51, 152, 303 and 404 Pairs.
22 Gauge—11, 16, 26, 51, 76, 101, 152, 303 and 404 Pairs.
19 Gauge—6, 11, 16, 26, 51 and 76 Pairs.

FULLY COLOR-CODED—REA Spec. PE-22:
24 Gauge—25, 50 and 200 Pairs.
22 Gauge—11, 16, 26, 51, 76, 101, 152, 303 and 404 Pairs
19 Gauge—25 and 50 Pairs.

FULLY COLOR-CODED—Old REA Spec. PE-22:
26 Gauge—26 Pair.
24 Gauge—202 Pair.
22 Gauge—16, 26, 76, 101, 152 Pairs.
19 Gauge—16 and 51 Pairs.
ABOVE IS SAMPLE LISTING. Also Have Direct Burial PE-23 Spec.

CALL TELE-WIRE COLLECT @ Axtel 7-4756
For Your Price and Quick Delivery!

TELE-WIRE SUPPLY COMPANY, INC.
178-10 LIBERTY AVENUE **JAMAICA 33, L.I., N. Y.**

FOR SALE

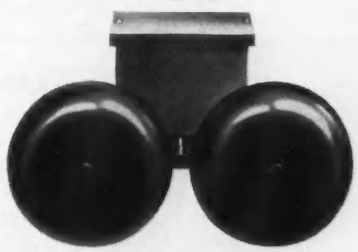
WESTERN ELECTRIC No. 634C Sub-sets, metal box, straight line ringers. Western Electric 202 telephones with F-1 hand-sets, less dial with blank. 400K Magneto sub-sets, make offer. F.O.B. Blythe, California. Southwestern Telephone Co., Box 488, Blythe, California.

DECALS
Made for trucks and equipment
Small or large quantities
Write for free catalog.
MATHEWS COMPANY
827 S. Harvey **Oak Park, Ill.**

HYDRAULIC CONTROLLED
STERLING
EARTH BORING MACHINES
WYOMING VALLEY EQUIPMENT DIV.
714 WYOMING AVE., KINGSTON, PA.

LOUD RINGING EXTENSION BELLS

With 6-inch gongs and non-magnetic aluminum cases. Available in straight line and all frequency ringing.



The non-magnetic aluminum case produces a better & louder tone, is much lighter in weight than iron and will stand damp and hot climate. Suitable for indoor as well as outdoor installations. Ideal for all noisy and distant locations.

SPECIAL RESISTANCE QUOTED ON REQUEST

All prices are F.O.B. Chicago, Ill.

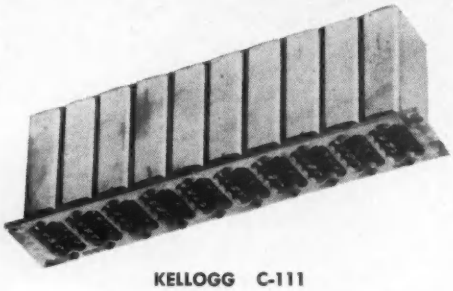
TELEPHONE REPAIR & SUPPLY CO.

1760 W. Lunt Ave. RO 4-3817-8

Chicago 26, Ill.

USE TELEPHONE ENGINEER AND MANAGEMENT'S CLEARING HOUSE
To locate workers—jobs—merchandise.
A small ad covers the field.

PLAN TO CONVERT
Magneto To Dial



KELLOGG C-111

Start now by using CB phones in town — one of these coils connected to each drop, thru condenser to common battery will provide CB service on that line. Subscriber signals operator by lifting handset and rings off by restoring it.

New $1.50 Used—A-1 $1.00

Mounting—10 coil for 19" rack $2.50

Condensers for use with above 2.MF. Stromberg-Carlson 50c

TELEPHONES

(completely reconditioned)

Western Electric #302 with F-I handset, 5-H dial. Ringers; St. Line, Synchromonic 16, 30, 42, 54, 66 cycle. Ready for service—immediate delivery $12.50

#302, as above, equipped with F-4 handset with T-1 transmitter—U-1 receiver (500 type) $15.00

#302, as above, but blanked for dial (F-1) $10.00

A.E. type 40, St. line, 16, 30, 42, 54, 66 cycle ringers, with #24 or later type dial (fully reconditioned) $12.50

(coiled handset cords, add 50 cents)

Brand New $12.50 each in std. package 8 or 10

Kellogg #5812 MX

5812 MX

5 bar, 1600 ohm, anti-sidetone circuit. Complete with F27 handset coiled cord. Oak cabinet, painted dull green. New and perfect—original factory pack .....$12.50 each

Less than 8 or 10 .....$13.50 each

PIECE PARTS

Kellogg #83-B (48 ohm) capsule type receivers to replace diaphram receivers in F-27, etc., handsets, New	$ 1.00 Each
Receiver Caps P-69426-3 (required for conversion)	.20 Each
Kellogg Transmitters, New	.50 Each
Handsets, W.E. E-1, F-1, F-3, A.E. 41, Kellogg F-27, etc.	
Long Receivers, W.E., A.E., Kellogg, New	1.50 Each
Modern Transmitter fronts with capsule, New	1.50 Each
Kellogg Housing for #925 (P-58724), New..	1.00 Each

All New Material (unless otherwise noted) priced F.O.B. Los Angeles
Shipped on Approval—Satisfaction Guaranteed

TELECTRIC CO.

1218 Venice Blvd. **Richmond 8-2249**

Los Angeles 6, Calif.

ADDING POSITIONS or LINES to your manual exchange?

Kellogg - W.E. - Stromberg-Carlson

(New or good used)

LINE—LAMP JACKS

TRUNK EQUIPMENT

CORD CIRCUITS

REPEATING COILS

SWBD CABLE, braid-plastic-lead

COMPLETE POSITIONS

CB - Universal - Magneto

Kellogg - W.E. - Stromberg-Carlson

also

PBX, cord & cordless

quoted "as removed from service" or "completely reconditioned"

Tell us what you need— let us quote from stock on hand—

Our *Low Prices* on A-1 equipment will *astound* you.

MDF PROTECTION

Western Electric (fully equipped)

#C 50 A, 50 pr. group, new	$40.
reconditioned	25.
C 52 A, 52 pr. new	42.
reconditioned	27.
C 25 A, 25 pr. (½ of C50), new....	20.
1268 A, 20 pr. new	10.
1268 B, 23 pr. new	12.
1269 A, 20 pr., new	10.
1435W(1269-A-wood base), new	10.
1435 U, Fuse group, new	5.
Heat Coils. 76A, new	10¢

Frames, MDF, W.E. & Cook 6 & 8 ft., single or up to 5 verticals in unit—save over half.

FUSES, 35A, B, C, H, S. New, 10¢. ($9 hund., $80 thousand) 75,000 in stock (standard W.E. pack, 10 or 50)

OPEN WIRE PROTECTION

WE #83A (#84A in wp. mtg. box, 5 pr. block equipped with #26 & #30)

New $5.00—Reconditioned $4.00

Cable Terminals—Most Types

STROMBERG-CARLSON

Transmitter

A DIVISION OF GENERAL DYNAMICS CORPORATION

News and views of Independent telephone people. VOLUME 8, NO. 2 • MAY 1959

Toll Ticketing for Kalama, Wash. "More than pays for itself"

Less than 60 days after its cutover at the Kalama Telephone Company, the first Stromberg-Carlson Toll Ticketing *Line Identification* System in the State of Washington was more than paying for itself, according to Darrel Coffey, manager.

Mr. Coffey had hoped for only 100 completed toll calls per day to justify the Toll Ticketing equipment, but up to 44 per cent more than the expected total of customer-dialed toll calls were going through the line identification equipment.

Without operator assistance or identification, the first such toll ticketing installation in Washington allows subscribers in Kalama to dial directly their calls to nearby communities along the Columbia River and famous Route 99 in Washington. Kalama has been served with XY® Dial equipment since 1953, and is ready now for nationwide Direct Distance Dialing.

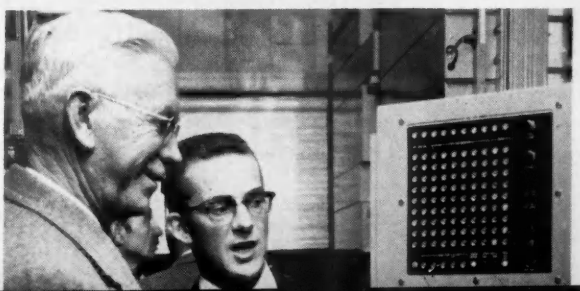
The equipment had been ready for service about two weeks before the actual cutover took place. This allowed company representatives plenty of time to contact subscribers, explain how to dial correctly, and deliver new directories with listings of dialable communities. As each customer was contacted, he was instructed that he could use the new system immediately.

Open house for the general public was held a week after the Toll Ticketing cutover.

Ron Coffey shows XY Toll Ticketing equipment to two interested guests.

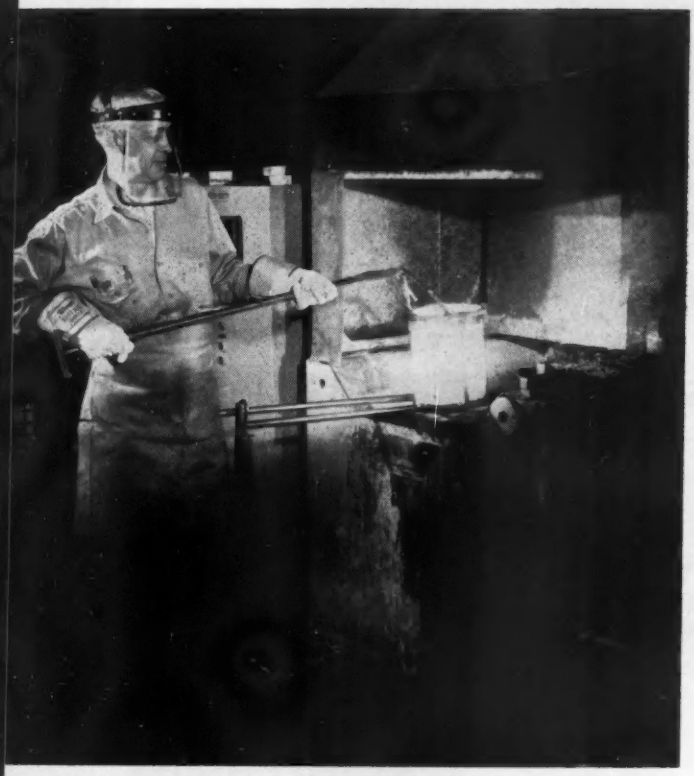
Mr. D. W. Coffey, manager of Kalama Telephone Co. accepts cup of coffee during open house.

Ron Coffey, holding XY Toll Ticketing Recorder, explains advantages of magnetic tape to Mr. J. P. Cerveny, LaCenter (Wash.) Tel. Co.; and Mr. and Mrs. Ray Smith, Columbia Tel. Co., Corbett, Ore. Mr. E. D. Larson, sales representative, looks on.

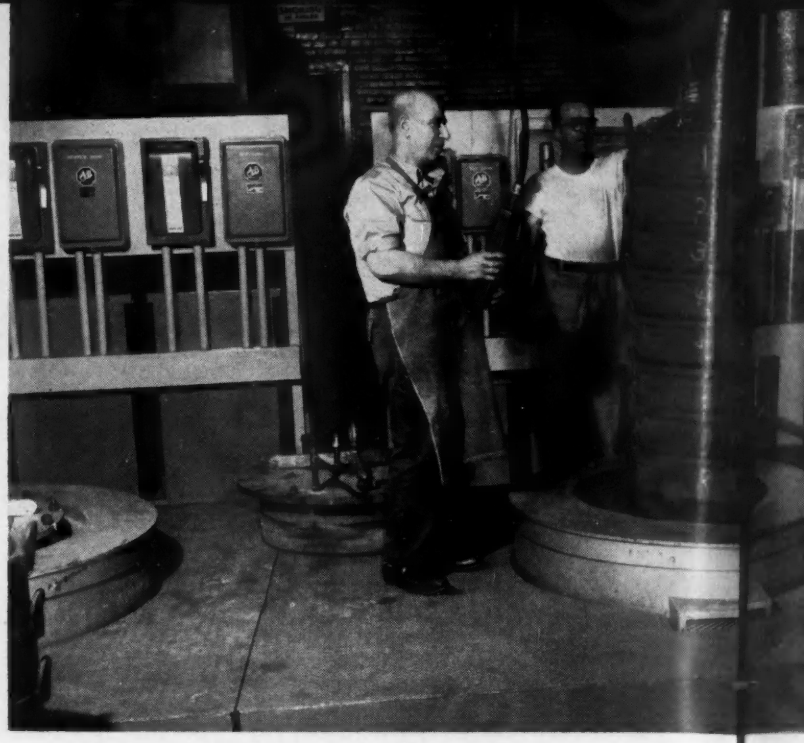


Subject of discussion: monitoring panel, which automatically locates any troubles in the equipment.

Stromberg-Carlson's installation foreman Ken Sandner, and E. D. Larson, look at printed toll ticket. Test desk is at left.



Hot! Bud Hammond handles this hardening operation. Parts are placed in a 1600°F bath of cyanide salt, quenched in oil, then tempered to give cog roller, pinion assemblies and other parts a hard outer case and tough inner core.



New hydrogen annealing furnaces, each capable of handling a 3-ton load, keep pace with increased demand for vital parts while adding that extra measure of reliability and durability. Here, Anthony Vasta and Douglas Brown remove load that had been kept at 1850°F for 3 hours.

"Some like it hot."

Ansel Koegler, Patrick Brimstein and Robert Waldvogel stand by small box furnaces replaced by new hydrogen annealing furnaces.

"It looks just like a miniature steel mill," said one interested visitor as he passed the Heat Treating Department at Stromberg-Carlson.

What he saw were parts of the XY® Universal Switch and other familiar telephone components getting that extra measure of reliability and durability so much a part of Stromberg-Carlson products.

Reliability and durability, usually considered intangibles, can be measured! The Heat Treating Department makes sure of that. Through processes of annealing, casehardening and austempering, this unique department, under Foreman Patrick Brimstein, puts that "wearability" in every XY Universal Switch, or the right electrical property in relay parts, receiver parts and hundreds of other vital telephone and switchboard components; and has been doing this for years.

Recently this department was relocated in more spacious quarters. The change gave production engineers Ansel Koegler and Robert Waldvogel the needed area to arrange the department and install two large hydrogen annealing furnaces to keep pace with increased demands for those vital parts. The two furnaces, each capable of handling a three-ton load, replace six small box furnaces.

The low-carbon metal to be annealed by the furnaces is packed in a sealed retort. Nitrogen is used to flush out all the air before hydrogen is applied. The unfinished parts are then heated to 1850° F, where it is held for three hours. After that it is cooled first at 100° an hour and later at 150°, until room temperature is reached. With all impurities removed the metal is now ready for plating and the production line. The purity of the parts makes them superior for sensitive, quick-acting, dependable relays.

Two types of hardening operations are also carried out in the Heat Treating Department. Casehardening, for example, places a hard metal shell around the part for long wearing properties while a tough inner core gives the same part unusual strength. The cog roller, pinion assembly, pawls

e not..."

and the X gear cluster get this treatment: the parts are placed in a 1600°F bath of *cyanide* salt, quenched in oil, then tempered to the specific hardness.

The other type of hardening is called austempering. This gives the parts, such as the Y carriage and the locksprings, the same hardness as casehardening but with ductility so that they may be easily flexed without breaking. A bath at 1600°F in a *neutral* salt, then another bath at 600°F, held for 20 minutes and finally air cooled gives the parts the necessary properties. Guide rules and hinge brackets on the XY Universal Switch get both processes: casehardening and austempering.

Since Stromberg-Carlson makes almost all the parts used in the telephones and switchboards, it is important to maintain rigid standards while producing quantity parts. The Heat Treating Department is doing more than its share while it adds to the life of the parts and lowers maintenance costs for the operating company.

The 59 Story

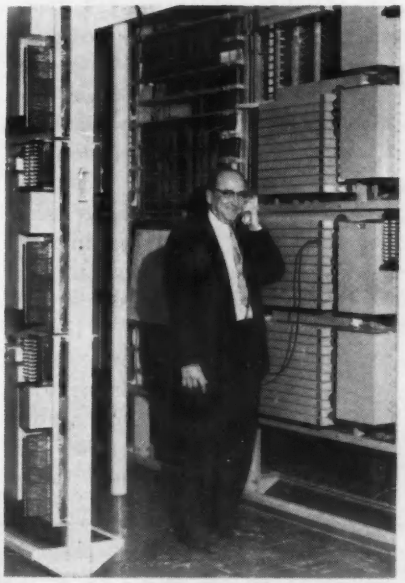
Helping her father, Allen Peebles, host the open house at Livingston, Texas, is Miss Leslie Peebles. Others are identified below.

The *year* '59 is only coincidental.

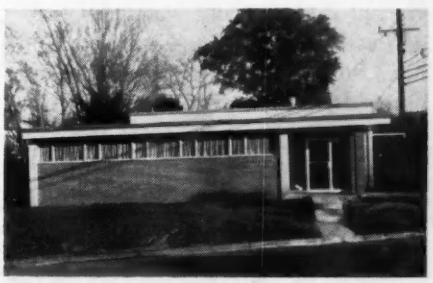
Reference is to U.S. Highway No. 59 — particularly that portion in east-central Texas — and the reason is well stated in a letter from Rex Atkinson, plant manager of the Livingston Telephone Company.

"January 4th, 1959, at 12:17 A.M. was a great moment to me. At that time the last link in the 'XY' Highway (U.S. 59) was put into service. Livingston's conversion meant that all 100% Independent telephone exchanges from Houston to Tenaha are using XY® Dial equipment."

Livingston is in the Big Thicket area of Texas, with lumber the principal industry, followed by cattle, oil and farming. Growth here is as steady as the towering pine trees which are the lifeblood of the area. Even as engineering progressed on this exchange, higher potential called for revisions upward.



Beautiful inside and out. Rex Atkinson, plant manager, worked long and hard for this moment when Livingston completed the XY Dial chain of Independents along Highway 59. The 1400-terminal office meets present needs — has ample provision for growth.

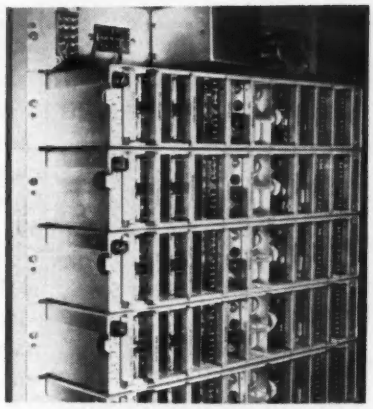


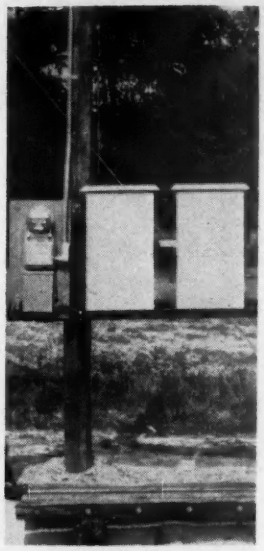
'59 for 59 . . . goal achieved! Congratulations to the Smiths, Peebles and Atkinsons. Wish we could have joined the crowd at your open house.

Board of Directors of the Livingston Telephone Company. Seated (left to right): A. W. Peebles, general manager and treasurer; S. Ross Smith, president; Louis Gerlach, director. Standing (left to right): Allen Peebles, secretary; Sidney Smith, vice-president.

Wires break . . . can't do a thing with these numb fingers . . . ice down there looks awful hard . . . where do I string this extra lead? There must be a better way.

There is a better way





There is a better way — from point of view of both cost and serviceability. Stromberg-Carlson 561 Subscriber Carrier is paying its way handsomely in widely diverse applications all over the country.

Pole-sitting as recreation is for the birds! And even they have little stomach for the winters in Minnesota and North Dakota. Although many subscribers in this region follow the birds south in the fall, telephone men must continue to give service year round. That's just one of several reasons why the Garden Valley Telephone Company of Erskine, Minnesota, favors subscriber carrier.

Recently Mr. Carl Ostby, general manager of this company, invited some neighboring operators to attend a seminar on subscriber carrier applications, using the several installations of the Garden Valley Company as a laboratory. Among the thirty people in attendance were: Mr. Elden Eckles, president of the Blue Earth (Minn.) Telephone Company; Mr. John Holland, manager of the New Ulm (Minn.) Rural Telephone Company; Mr. Fred Ahlgren, manager of the Reservation Mutual Aid Telephone Company of Parshall, No. Dak.; Mr. L. E. Armfield of Fargo, No. Dak.

Assisting Mr. Ostby were Mr. Harold Peterson and Mr. Oran Ness of the Garden Valley Company, and Mr. Robert Layburn, Carrier Program Manager, of Stromberg-Carlson.

Carl Ostby of the Garden Valley Telephone Co., Erskine, Minnesota.

Franklin cutover continues XY Dial program for Texas Telephone and Telegraph Company

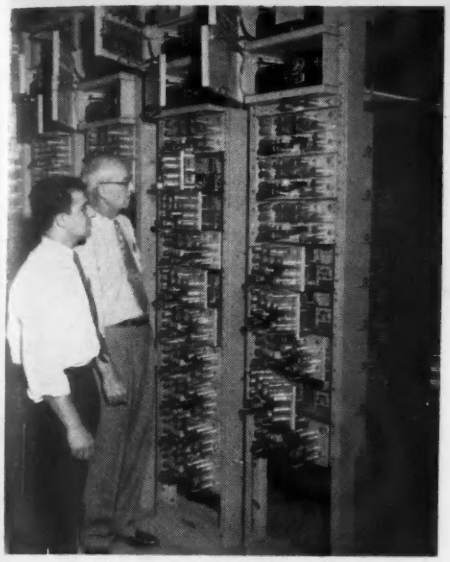
"Everyone" came to the Franklin, Texas, cutover; (l to r) Carl Scott, Texas Tel. and Tel.; H. T. Brink, Mid-Texas Tel. Co., Killeen; Clarence Trent, Texas Tel. and Tel.; Chris Finn, Mid-Texas Tel. Co.; E. McDonald, R.E.A. Field Engineer; Seaborn Lipsey, vice-pres.; Robert Talley and W. G. Winters, pres., Texas Tel. and Tel. Co.

"Everyone" was on hand at the Franklin, Texas, cutover to witness the beginning of the "homestretch" for Texas Telephone and Telegraph Company's latest modernization program.

Thousands of other subscribers in east-central Texas served by this Independent telephone company — one of the largest in Texas — are looking forward to that day in the very near future when they, too, will be having dial service.

This cutover at Franklin was really just the beginning of the new program to bring XY® Dial to twenty more of the company's forty-five exchanges. Fairfield and Lake Whitney have been enjoying XY Dial service for some time; the other 19 exchanges now being installed will be cut over as soon as completed.

President of the Texas Telephone and Telegraph Company and a Pioneer in telephony is Mr. W. G. Winters. Under his direction, the company's progress has advanced by leaps and bounds. Helping him are his sons, Francis and James, vice-president and company attorney respectively; Mr. W. T. Reichel, assistant vice-president and engineer; Mr. Seaborn Lipsey, vice-president in charge of plant; Mr. J. B. Swink, commercial manager, and Mr. Warren Barnett, auditor.



56 channels of Stromberg-Carlson 511 Multiplex handle toll service between exchanges of the Western Carolina Telephone Company.

Stromberg-Carlson Multiplex makes

Microwave pay dividends

"Microwave has matured; as we see it now it's a simple matter of economics in relation to the time factor."

We were talking with Mr. William Kern of the Rochester (N.Y.) Telephone Corporation. This company was among the first to use radio multiplexing for regular telephone circuits — installed what was probably the largest Independent system of its time several years ago. Since then the company has continued to add new legs to the network and regularly adds more channels as needed.

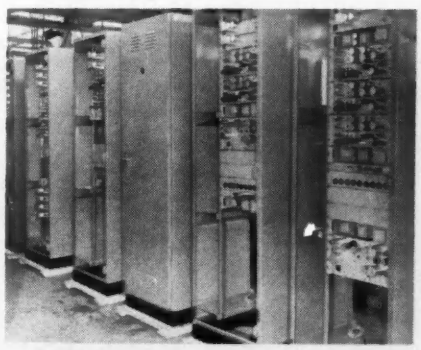
"At one time we considered this [microwave] experimental; now we think of it simply as another tool — fully as reliable as cable — to be used where appropriate." Mr. Kern continued his discussion, but strongly recommended that we go out to Brockport — talk with Mr. Harry Follett, foreman of the Special Equipment Division, on location.

Brockport lies about 20 miles west of Rochester — an "Erie Canal" town which still has prominence in its own right, even though it finds itself tied closer and closer to its giant neighbor to the East. This transition found toll traffic climbing much faster, percentage-wise, than local exchange traffic. In addition, the dog-leg cable route from Rochester to Brockport traversed a rapidly-growing suburban area where all these cable circuits were desperately needed for residential service. The microwave system as installed (and subsequently expanded) comprises 54 channels, 49 toll and 5 full-talk circuits. At the Rochester terminus, and using the same tower, another system of 89 Channels veers off diagonally to provide similar service for exchanges at some distance to the south.

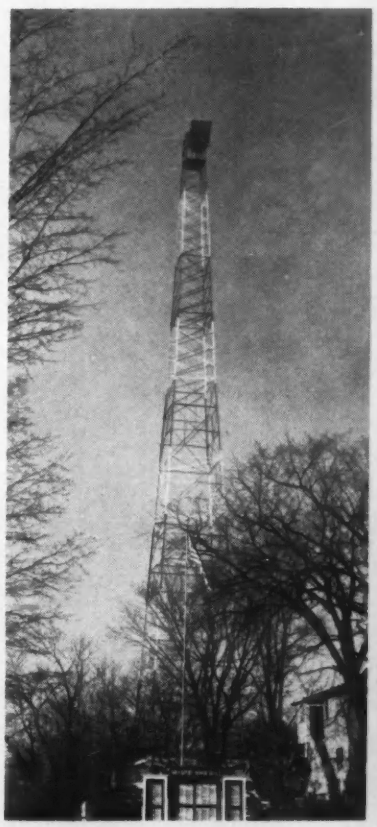
"Troubles? Less than for physical circuits . . . Time? A distinct advantage . . . Economics? If we hadn't been proved right in our original decision, we wouldn't have ordered more."

In a future issue the somewhat different application of 511 Multiplex by the Western Carolina Telephone Company will be discussed.

Microwave hurdles mountains, spans inaccessible valleys, laughs at weather problems. No question about paying for itself in this rugged country.



13 special cabinets of 511 Multiplex destined for new hydro-electric development in Manitoba, Canada. Basic channeling equipment lends itself to wide variety of applications.



Dominating the town of Brockport, N. Y., is microwave tower of Rochester Telephone Corp. State Teachers College and development of new industry beyond metropolitan limits led to additional order of 511 Multiplex channels.

Impressive headquarters of Western States Telephone Company establishes phone company as leader in transition to mid-20th Century.

Arizona calls:

According to World Time, this call from Kingman, Arizona, to Hong Kong, China, took more than half a day to complete (you figure it)! Actually Mrs. Margie Lum was connected with her parents through the new XY dial equipment and No. 3 Toll Board in a matter of minutes. Mr. C. M. Hart, general manager of the Citizens Utilities Company, and Charlie Lum wait their turn.

Holbrook is important junction for rail and auto travel — for same reason is a major toll center. 8-position board became very active with morning traffic day after cut-over.

Responsible for Holbrook's improved service. At right, Mr. E. H. Jennings, vice-president and general manager; center, Mr. Orville Schureman, wire chief; left, Mr. John Warren, comptroller and local manager.

from Kingman and Holbrook

U.S. Route 66 is "Main St." of the Southwest — and the address of two cities recently converted to XY®Dial. First in time was Kingman. Here the westbound traveler must make a decision: the man-made wonder of Hoover Dam and Lake Mead, the fabled casinos of Las Vegas, awesome Death Valley and the eastern gateway to the High Sierras and Yosemite; or the Mojave Desert route to Hollywood, Los Angeles and all of Southern California.

While you're making up your mind, stop and enjoy Kingman — a city rich in history but oriented to the future. Mr. C. M. Hart, general manager of the Citizens Utilities Company, will be proud to show his dial office serving nearly 2,000 stations; to talk about the assured future based on its strategic location and proximity to power and water from the Colorado dams at Boulder City and Parker.

Just a few miles away, in the Lake Mead Recreation Area at Davis Dam, is a town with the enticing name of Bullhead City — also a Citizens Utilities property — and a wonderful place to tarry awhile in complete relaxation.

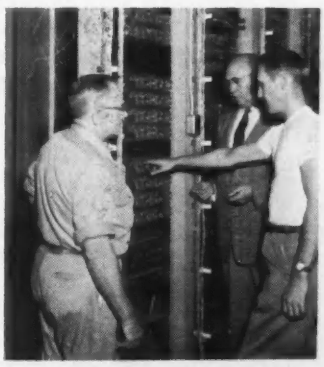
But perhaps your trip is from west to east. You have just visited the Grand Canyon, and nearby Holbrook is another place of decision: Painted Desert, Petrified Forest, Navajo Country and storied Santa Fe; or the route through the Apache Cliff Dwellings toward El Paso and Carlsbad Caverns.

Holbrook — junction, watering spot, favored stop-over — is headquarters for the Western States Telephone Company, communications center for the other Arizona exchanges which dot the route to El Paso. This company also has holdings in New Mexico — one bearing the unusual name of Truth or Consequences — and in the western corner of Texas where Mr. C. H. Jennings, president, makes his home.

All of the exchanges — some 5000 stations — have been, or soon will be, converted to XY dial. The cutover at Holbrook was the occasion for many visitors prominent in the industry to observe progress and extend congratulations. Among these were Arizona Commission chairman George F. Senner, Jr.; Mountain States assistant vice-president S. A. Watt; C. J. Wimer and Mr. and Mrs. Morris Measows of Wimer Associates; Mr. T. C. Thompson of Rochester, N. Y., and Mr. J. P. Galligan of San Francisco.

Mr. E. J. Jennings, vice-president and general manager, and Mrs. Jennings were radiant hosts, welcoming the many guests to Holbrook.

"Excuse it if I sound sleepy." Mayor McCarthy of Kingman receives first call placed through city's XY dial system.



Before cutover at Kingman: Mr. M. M. Wright, Mr. C. M. Hart of Citizens Utilities; Mr. Charles Dawson of Stromberg-Carlson.

About to be served dinner preceding cutover at Holbrook: Mr. E. J. Jennings and (on his left) Mrs. E. J. Jennings. Directly over server's tray we see Mr. C. H. Jennings, president, and Mrs. C. H. Jennings.

Among the many guests attending the open house at West Columbia, Texas, were Charles Laurence, Garrison Tel. Co.; W. J. Riley, Stromberg-Carlson; Eddie Svatek, Garrison Tel. Co.; Mr. B. Simmon, Jr., pres. & manager; Fred Fairly, Stromberg-Carlson; Mich Philips, Garrison Tel. Co.; and Carl Price, Stromberg-Carlson.

Mr. B. Simmon, Jr., Mr. Mawin Van Cleave, R. E. A. Field Representative, near XY Dial equipment.

Dial open house for Texas' first capital

More than a thousand guests gave dial service in West Columbia, Texas' first capital, a rousing welcome recently when the Garrison Telephone Company held open house in their new exchange building.

The contrast between the old and the new in telephone service was the highlight of the open house celebration in this town just southwest of Houston. Mr. B. Simmon, Jr., president of the company, arranged for displays including one of the first magneto switchboards, furnished by Fort Bend Tel. Co., and a Stromberg-Carlson "Hands-Free" Telephone.

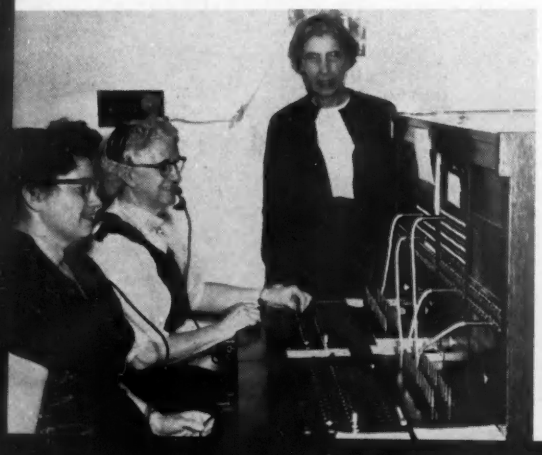
Guests were also shown the Stromberg-Carlson Line Routiner which automatically tests all outside lines and records permanently, on tape, the number of the line in trouble and the nature of the trouble encountered. The Stromberg-Carlson No. 3 Tollboard, with four positions, also attracted many of the visitors.

In only eleven years, since Mr. Simmon has managed the company, he has converted to XY® Dial and increased the number of stations served from 372 to 1200.

Ready for calls at Tollboard are Norma Little, Marie Boff, W. Danford and Geneva Lieb.

S. Stalford, S.C. Installation Foreman, at test desk, including printing device, left, test turret and line routiner.

"Hello, Canada!"



Tay Tel. System operators Mrs. Jack Todd, Mrs. Laura Belfry and Miss Eva Lidstone.

Serving subscribers faithfully for 50 years from the same location is a record. But the Tay Municipal Telephone System in Victoria Harbour, Ontario, finally moved — one door away — and improved service for 400 subscribers.

The move included a new building, a new switchboard, new cables, and new telephones for this tourist resort on Georgian Bay, part of Lake Huron, about 100 miles north of Toronto. Midland, Ontario, and the Martyrs' Shrine, which commemorates massacre of the Jesuit Priests, Brebeuf and Lallemand, by the Iroquois Indians, is six miles west.

Arrangements for the equipment, including a two-position switchboard, were made through Hackbusch Electronics, Ltd., Stromberg-Carlson's Canadian representatives.

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Index to Advertisers

Acme Electric Corp. 74
Acme Visible Records, Inc. 66-67
Acorn Insulated Wire Co., Inc. 101
Airtronics International Corp. 83
Alphaduct Wire & Cable Co. 101
American Chain & Cable Co. (Wright Hoist Division) 89
American Steel & Wire Div. (U. S. Steel Corp.) 10
Associated Engineers, Inc. 100
Auburn Machine Works 94
Automatic Electric Sales Corp. 8-9, 20-21, 30-31, 58-59

Bashlin Co., W. M. 101
Benner-Nawman, Inc. 27
Berry & Co., L. M. ..... Inside Front Cover
Blaw-Knox Co. 16
Buckeye Telephone & Supply Co. 89, 102

Calculagraph Co. 32
Chance Co., A. B. 87
Collins Radio Co. 71
Commercial Cord Co., Inc. 99, 101
Communication Equip. & Engrg. Co. 84
Copperweld Steel Co. 33
Crane Inc., Carl C. 100

Davis Construction Co. 100
Dial Haven, Inc. 100
Donnelley & Sons, R. R. 89

Fanner Manufacturing Co. 12
Fitchburg Engineering Corp. 86

General Insulated Wire Works 94
General Tel. Directory Co. ..... 101, Back Cover
Gladwin Plastics, Inc. 82
Graybar Electric Co. 69
Greenlee Tool Co. 72

Henkels & McCoy 100
Highway Trailer Co. 101
Holan Corp. 11
Holub Industries, Inc. 89

Indiana Steel & Wire Co., Inc. 70
Instrument Laboratories (Stewart Bros. Div.) 86
International Business Machines (IBM) 34

Johns-Manville 90

Kander & Co., Allen 100
Kellogg Switchboard & Supply Co. 6-7, 14-15, 95
Klein & Sons, Mathias 68
Koiled Kords, Inc. 4
Koppers Co. 100

Leich Sales Corp. 36-37
Lorain Products Corp. 13

Mackenzie Electronics, Inc. 74
Mathews Co. 103
McCabe-Powers Body Co. ..... Inside Back Cover
McGrath Engineering, Inc. 100

Natco Corp. 73

Page & Hill, Inc. 26
Phelps-Dodge Copper Products Co. 28-29
Philco Corp. 102
Piedmont Wood Preserving Co. 101
Preformed Line Products 17-18

Raytheon Manufacturing Co. 85
Reliable Electric Co. 101
Rex Corp. 19
Rohn Mfg. Co. 64
Rolatape, Inc. 62
Runzel Cord & Wire Co. 101

Sherron Metallic Corp. 1, 101
Sloan, Cook & Lowe 100
Stewart Bros. (Div. of Instrument Lab's.) 86
Stromberg-Carlson Co. 2-3, 105-112
Superior Cable Corp. 23
Suttle Equipment Corp. 77, 100

Taylor-Colquitt Co. 27, 101
Telectric Co. 104
Telephone Engineers & Technicians Corp. of America 101
Telephone Repair & Supply Co. 101, 103
Tele-Wire Supply Co. 103
Texas Creosoting Co. 101
Thornhill Publishing Co. 73
Transandean Associates 55
Tudor & Yager 100

Universal Controls Corp. 38
U. S. Motors Corp. 50
U. S. Steel Corp. (American Steel & Wire Div.) 10

Whitney Blake Co. 24, 25
Williams Inspection Co., Inc., A. W. 100
Wright Hoist Division (American Chain & Cable Co.) 89
Wyoming Valley Equip. Div. 103

THE BACK OF THE BOOK

By JOHN G. REYNOLDS

Tall Texas Tails

FROM THE West Texas town of Floydada come two stories that the installer-repairmen telling them insist are true.

C. R. King says he went to check trouble on the FM carrier at South Plains. Hung up on the wires, 20 feet off the ground, was a baby carriage.

Later that same day E. F. Stroud went out on a second trouble report on the same line. This time there was a metal flag pole tangled up in the wires.

Now, wait a minute!

Booth With A Past

ALTHOUGH much in evidence at a New York ski resort, *Belle Brougham* is no athlete. She is not even equipped with runners. According to *The New York Times,* Belle is a four-wheeled closed carriage and serves locally as a telephone booth for both local residents and visiting sportsmen.

The vehicle is of the type made famous by the first Lord Brougham almost two centuries ago. In its youth it transported the resort owner's family. The name Belle was inspired by the ring of the first incoming call.

Until a few years ago the carriage was stationed at the snow center's old canteen as a curiosity piece. When the eating place was larger, it was decided that Belle should earn her keep.

Recently, with the consent of the local telephone company, Belle assumed her present duties.

"I suppose," said the manager, "she's found her final resting place. We'd have to rip out a side of the building if we ever wanted to hitch her up again."

Nearly Talked To Himself

HE NEARLY talked to himself — that's what happened to *Al Dozer,* a Michigan Bell installer in Townsend district, Detroit.

Recently Al pulled his truck into an alley to change a cable pair for a residential telephone. As he went up the pole, he saw a woman empty some trash in the alley and then return to her house. The next thing he did was to call the number of the telephone he was to work on.

A woman answered and Al said, "This's the telephone company and we'll be working on your line. Your telephone will be out of service for about 15 minutes."

The woman said, "All right, but there's a telephone man working here now. Just a minute and I'll call him."

Immediately, the woman put the phone down and Al could hear her walk through the house, slam the door to the porch and then saw her as she called, "Yoo hoo! You're wanted on the phone."

Al shouted back, "Thanks, but never mind. Just hang up your telephone, please."

"Prize Request"

WE WELL know telephone operators are called upon to be everything from an hourglass to a dictionary but *Long Lines* magazine has reported a request received by a West Virginia operator that should win some sort of prize.

According to *Long Lines* this prize request started when a child called the operator and asked to be rung back in three minutes. Mother, it seemed, was taking the baby's temperature and had no watch by which to tell the time. The operator did as requested. The baby was fine.

At about the same time, another customer called to request aid in completing a crossword puzzle. The problem? A four-letter word beginning with LOY and meaning genius. Right along with the editors of *Long Lines,* we are still trying to figure out that one.

"Please do not deposit slugs! . . . Thank you!"

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